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ABSTRACT

The intellectual and social abilities of young precocious children and the effects of educational interventions on these children are examined in this third year report of a longitudinal study of the developmental patterns of unusually precocious children. The report focuses on several studies conducted with preschool and elementary school age children during the 1977-78 granting year. Included are a brief overview of the project structure; test performance results for the 1977-78 year, (including cognitive, social, and personality factor data); descriptions of 3 educational intervention programs studied, and a report on the current status of the longitudinal study's focal group of "extraordinarily precocious" children. The appendices which comprise approximately half the documents contain program information and related letters and brochures as well as 3 papers describing the identification of intellectual precocity in young children, social development in intellectually advanced children, and the tenets of the Early Entrance/Optimal Match Program. (Author/SE)

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IDENTIFICATION AND NURTURANCE OF EXTRAORDINARILY PRECOCIOUS YOUNG CHILDREN

Annual Report to the Spencer Foundation
Granting Period: September 1977 through August 1978

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Introduction

Our longitudinal study of children with extraordinary intellectual abilities has now entered its third year. During two years of pilot work supported by the Spencer Foundation (Robinson, 1974) and the first two years of the longitudinal study proper, we have accomplished the first goals set forth in the plan for the study (Robinson, Jackson, & Roedell, 1976a) and have made substantial progress toward subsequent goals. The purpose of this report is to summarize our progress to date, but particularly during the 1977-78 granting year.

Many of our findings have recently been reported elsewhere. They will not be restated in detail, but the original reports will be presented in the appendices. The present report contains a brief overview of the project structure, a summary of the progress of the longitudinal study and related educational intervention programs during the 1977-78 granting year, and a report on the current status of the study's focal group of "extraordinarily precocious" children.

Project Overview

The longitudinal study is the central component of a comprehensive set of research and service activities, all of which are directed toward furthering our understanding of intellectually advanced children and their educational experiences.

The longitudinal study and related projects are directed by Halbert B. Robinson, Professor of Psychology and Chairman of the Child Development Research Group. Principal associates are Nancy E. Jackson and Wendy C. Roedell, Research Assistant Professors. Supporting staff include a variety of research assistants and associates, counselors, preschool teachers and administrative personnel. A complete list of project staff members for the 1977-78 granting year is included as Appendix A1.

The interdisciplinary faculty members of the Child Development Research Group serve as advisors to the project. In addition to Professors Robinson, Jackson, and Roedell, this group consists of

Associate Professor Philip S. Dale of the Department of Psychology, Professor Ellis D. Evans of the School of Education, Professor Benson Jaffee of the School of Social Work, and Associate Professor of Psychology and Director of the Educational Assessment Center Clifford C. Lunneborg.

Educational programs provided by the project staff during the 1977-78 academic year included the Child Development Preschool/ Kindergarten, a model program supported jointly by the U. S. Office of Education and the Spencer Foundation, and a program of early admission to the University of Washington, primarily supported by a grant from the Ford Foundation. The project staff also operates a Diagnostic and Counseling Service for families of intellectually advanced children who request educational or other guidance. Documents describing these programs and services are included as Appendices A2 and A3. More complete descriptions of the service activities related to the longitudinal study are available in reports to the U. S. Office of Education (Robinson, Roedell, & Jackson, 1978) and the Ford Foundation (Robinson, Bell, Jackson, & Roedell, 1978).

Progress of the Longitudinal Study: 1977-78

Plan of the Study

The longitudinal study has been designed to answer both theoretical and practical questions about the nature of intellectual precocity and the best ways to nurture its development. It is the first large-scale longitudinal study of children with advanced intellectual abilities identified during their preschool years. It is also the first such study to rely on a contemporary multi-factor definition of intellectual abilities rather than a single index of precocity. In addition, the study is unique in its focus on children whose intellectual abilities are so extraordinarily advanced that they are truly without peers in typical educational settings.

While the central focus of the longitudinal study is on children who seem to have the potential to perform extraordinary intellectual feats, the study group includes a broad range of

of children who may be considered to be "at risk" for genius. We are, in fact, following almost all of the children who were nominated by their parents for inclusion in the study. If the parents proposed that their child was extraordinary, we have included him or her regardless of the psychometric results. Table 1 presents an overview of the various groups in the longitudinal sample. Reliance on parent nominations has yielded a sample with a very high mean ability level, but also very substantial variance. Maintenance of a sample with substantial variance in ability permits the repeated testing of longitudinal prediction hypotheses and facilitates comparisons between subgroups of greater and lesser ability.

Children in the longitudinal study sample have all been administered the comprehensive intellectual assessment battery described in Table 2 at some time between the ages of 2 and 5 years. Periodic reassessments include these measures of general and specific intellectual ability plus a test of academic achievement. Initial written reports from parents describing their children's intellectual accomplishments and interests are followed in subsequent years by questionnaires and interviews designed to collect information about changes in family status, the child's health and physical growth, current school placement, and adjustment to school.

As the children grow older, the nature of the indices used to monitor intellectual growth and the procedures used for collecting information about noncognitive factors will change. Tests appropriate for use with very young children will be supplanted by individual and group tests appropriate for administration to elementary-school-aged children whose intellectual and academic skills range up to adult levels. Reliance on parents for information about the children's interests, activities, and concerns will diminish as such information is more appropriately gathered from the children themselves.

In the long run, the study will answer questions about the level and pattern of the children's intellectual and academic abilities over a number of years. The ability measures will be related to a broad range of variables having to do with the children's

TABLE 1

Background Characteristics of Children in the Longitudinal Study Sample: June 1978

Cohort	N Girls	N Boys	% Ethnic Minority	Median Mother's Education Level	Median Father's Education Level	% Firstborn
1974-75	35	39	(3)	BA	BA	(76.4)
1975-76	27	37	(31.6)	BA	MA	(60.3)
1976-77	29	23	15.4	BA	BA+	69.2
1977-78	83	74	28.9	BA	BA+	73.2

NOTE: Percentages in parentheses are based on incomplete information

TABLE 2

Test Battery Components

Measure	Purpose
Short-form (starred items only) Stanford-Binet Intelligence Scale	Estimate of general and/or verbal reasoning ability
WPPSI/WISC-R Mazes Subtest WPPSI/WISC-R Block Design Subtest Seguin Form Board	Estimate of spatial-perceptual reasoning ability
McCarthy Scales of Children's Abilities Numerical Memory Subtest, Forward and Backward Series	Estimate of short-term memory
WPPSI/WISC-R Arithmetic Subtest	Estimate of mathematics skill
Informal Reading Assessment	Estimate of pre-reading and/or reading skill

personal and social development, their interactions with their families, schools, and other important socializing agencies, their success in school and during their adult life, etc. Special attention will be given to the effects of different school programs, particularly those which are developed for the children by the staff of the Child Development Research Group.

The Study Sample in 1978

Identification of children for the longitudinal study sample began in the fall of 1974 with the publication of a notice describing the pilot study. Since that time, four cohorts of subjects have been generated by annual publicity efforts. A news release distributed in January 1978 (Appendix A4) resulted in the identification of the most recent, and largest cohort. Newspaper, radio, and television publicity based on that release resulted in 537 inquiries from parents. Questionnaires calling for objective and anecdotal information about their child's current accomplishments were mailed to all of these parents, and 266 of them returned the questionnaire. As in previous years, many parents completing the questionnaire were interested in having their child considered for enrollment in the Child Development Preschool as well as for participation in the longitudinal study (n=204).

Since the number of questionnaires returned exceeded the number of children who could be individually tested in the time available, some preliminary selection of subjects was done on the basis of parent questionnaire information. No such selection process was employed in previous years, during which all nominated were accepted for the study. With a few exceptions[1], the children for the 1978 cohort were selected by dividing applicants into three groups on the basis of parent questionnaire information; all applicants in the two groups rated as likely to be most intellectually precocious were scheduled for testing, and a random sample of children was selected from the least promising group.

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[1]All children from racial minority groups were invited for testing, as were siblings of children already in the longitudinal study.

As of June 1978, the longitudinal study sample included a total of 347 children, 174 girls and 173 boys. The background characteristics of each cohort within the sample are summarized in Table 1. The high percentage of ethnic minority children in the 1978 cohort was influenced by the selection process. Since the sample is not intended to be representative of the Seattle area population in race or any other background factors, this particular source of selection bias is not a matter of concern.

Data reported in Appendix B (Jackson, 1978) document the fact that the 1978 cohort is not only large but also, like the previous cohorts, composed of highly able children.

Some sample attrition is inevitable in any long-term longitudinal study, although the experience of some investigators (e.g., Terman & Oden, 1959) suggests that attrition can be kept to a minimum in studies of intellectually advanced children. Our own experience to date has been that the principal loss of subjects has occurred between the first and second testing appointments, which typically have been one to two years apart. The Child Development Preschool has been used to generate interest in the longitudinal study, and some preschool applicants understandably lost interest in further participation in the longitudinal study when their child was not accepted for the preschool program.

Repeated requests for information or participation in follow-up activities will, therefore, be directed only to those families whose children have participated in at least two test sessions. This definition automatically includes all children who have attended the Child Development Preschool. By concentrating our efforts and resources on those families who have already demonstrated a commitment to the research project, we can minimize the possibility of subject attrition beyond the second testing session.

To date, five families who participated in one testing session and two families who completed two testing sessions have indicated that they do not wish to participate further in the longitudinal study. An additional nine families who were one-time participants cannot be located or have not responded to requests for information. The project staff remains in contact with the remaining 331 families from the total sample of 347 described above.

Findings of Short-term Research Projects

Stability of intellectual precocity: In 1977, a follow-up test battery was administered to sixty-five 4- and 5-year-old children from the longitudinal study sample. These data permitted the first full-scale analyses of longitudinal trends in test performance. The results which are available at this time are reported in Appendix B. Briefly, we found that performance of children on the Stanford-Binet was not highly stable from initial testing at the age of 2 or 3 years to follow-up testing at 4 or 5 years. In fact, initial test scores accounted for only about 25 percent of the variance in later scores. Individual children's scores often changed substantially, and large changes were more likely to be positive than negative in direction. The evaluation of information from parents not only contributed significantly to the prediction of later test performance, but even matched the Stanford-Binet in predictive power.

Social development: Another line of research has attempted to describe the social characteristics of children in the longitudinal study sample. The results are reported in Appendix C. Briefly, we have found that relationships between intellectual maturity and social knowledge tend to be stronger than relationships between intellectual maturity and social behavior. Our children were, in general, described as socially competent regardless of the measures used. There was, however, a substantial range of maturity in the behavior observed and noted by teachers. Furthermore, the most intellectually precocious children were not always the most socially mature.

An important aspect of this study was the finding that children's social behavior during free play time changed dramatically from the beginning to the end of the preschool year. The incidence of cooperative interactions among the children increased significantly, and this increase could not be explained simply as the result of maturation.

Temperament characteristics: Questionnaires designed to measure parents' perceptions of children's temperament characteristics were completed by parents selected from the longitudinal study sample. Initial analyses of these data (Macey, 1978) indicated that parents of children with extremely high IQs described their children no differently than did the parents of moderately high IQ children. No

particular profile of temperament characteristics described either subgroup or the sample as a whole. Further analyses of these data are in progress.

Parent-child intelligence test performance: Another short-term research project conducted in 1977-78 compared parents' and children's performances on Raven's Progressive Matrices. Preschool- and kindergarten-aged children enrolled in the Child Development Preschool/Kindergarten were given the Coloured Progressive Matrices (Raven, 1956, 1962) and their parents were administered the Advanced Progressive Matrices (Raven, 1962). Some of the youngest preschoolers did not complete the test, which is designed for children aged 5-1/2 years and older. However, many of the children performed very well. The highest score in the group was earned by a 6-year-old girl whose performance placed her within the top 5 percent of 10 year olds in the standardization population.

All parents scored within the top 5 percent of the standardization population for the Advanced Matrices, but there was substantial variation in their raw scores. Analyses of correlations between fathers' and mothers' raw scores and their children's raw scores, with differences in the children's chronological age partialled out, revealed no significant relationships between parents' and children's scores.

Conservation ability: Findings of a study of intellectually advanced preschoolers' performance on tests of conservation of quantity were reported in the 1977 Annual Report (Krinsky, Sjursen, Krinsky, Jackson & Robinson, 1977). This study was replicated during the 1977-78 school year (Krinsky, 1978), and performance on the set of conservation tasks presented in the Concept Assessment Kit (Goldschmidt & Bentler, 1968) was again found to be more strongly related to mental than to chronological age. Conservation ability was also found to be related to performance on the Mathematics subtest of the Peabody Individual Achievement Test and, to a lesser degree, to performance on the Block Design and Mazes subtests of the WPPSI. At each age level from 4 through 6 years, the performance of our children was found to be comparable to that of children in the standardization population who were about two years older. Thus it appears

that young children identified as intellectually advanced by traditional psychometric indices are also advanced in at least this aspect of logical reasoning ability.

Role-taking and understanding of reciprocal relations: A study of the development of logical reasoning skills in intellectually advanced children included fifteen 3-1/2- to 4-1/2-year-old children from our preschool. The study, which will be continued during the 1978-79 school year, suggested that developmental changes in performance on social role-taking tasks, as well as on tasks involving the understanding of reciprocal relationships between objects, occur earlier among intellectually advanced children. Changes which take place at about age 4-1/2 in children of average intellectual ability occurred at about age 3 years, 10 months in this sample (Greenberg, personal communication).

Short-term memory: There is substantial evidence from studies of older children and adults that performance on short-term memory tasks is related to general intellectual ability. During the period from 1976 through 1978, three different types of short-term memory tasks were administered to groups of children enrolled in our preschool: (1) the "See and Remember" subtest of the CIRCUS battery (Anderson et al., 1974-75), a test of picture recognition and recall; (2) the Visual Sequential Memory subtest of the Illinois Test of Psycholinguistic Abilities (Kirk, McCarthy & Kirk, 1968); and (3) a variant of Posner's measure of speed to access physical versus name information about letter stimuli (Keating & Bobbitt, 1978). The results of all three studies were consistent; the intellectually advanced children did not perform at strikingly advanced levels, and none of the predicted relationships were found between performance on any of these tasks and indices of either general or specific intellectual abilities. A persistent problem was the difficulty in sustaining the children's interest in the tasks.

Cranial Measurement: Several measures of head size and development were made using the children in the preschool during the 1976-77 and 1977-78 school years. Both sets of data indicate that our children have longer but not wider heads than do children of the same ages in the general population. This study also revealed a positive

relationship between deviation from the average in head length (distance between forehead and back of head) and IQ for boys (r=.52) and girls (r=.48). The numbers in the study were small (eight boys and ten girls), and these results can be considered as suggestive only.

In summary, our findings to date have broadened our understanding of the cognitive, social, and personality characteristics of young, intellectually advanced children. We have also established the importance of considering information from parents as well as standard test performances in predicting the later intellectual abilities of this group. During 1978-79, several of the studies described above will be prepared for publication.

Educational Interventions

A major goal of the longitudinal study is to evaluate the impact of different educational experiences on children with different degrees and patterns of intellectual ability. An important factor that must be considered in evaluating differences within our sample is the potential impact of the test performance data and guidance routinely available to all families participating in the longitudinal study. This issue was mentioned in the 1977 report, and data now available suggest that participation in the study is indeed, in itself, having some impact on the school careers of the participants. Parents of sixty-five children from the sample who entered kindergarten or first grade in the fall of 1978 recently responded to a request for information about the kind of program their child was attending. Fifty-one percent of these parents reported that their child was involved in either a part- or full-time program for gifted children. While no direct standard of comparison is available, it seems reasonable to assume that this percentage is higher than would be true of a comparable group of children whose families had not had access to the identification and counseling resources we provide. Parents' comments support this interpretation.

Numbers of children from the longitudinal study sample who have completed a year or more of elementary school are still too small for a comprehensive evaluation of success and satisfaction in relation to their ability pattern and program types. Several trends seem to

be emerging, however. Parents of children who might be described as moderately advanced in intellectual and academic abilities have reported varying degrees of satisfaction with their children's academic and social experiences at school. Most remarks have been positive, but many parents have expressed a desire for more academic content in kindergarten programs, smaller classes, and a primary curriculum covering more than basic skills. Most of the children seem to be happy in school, doing well, and making friends.

The first school experiences of children who are in our most precocious group are described in detail in the next chapter of this report. Comments from parents of children enrolled in public or private programs for intellectually gifted children were generally positive; reports from parents of children in more standard public or private programs were split between positive and negative evaluations.

Child Development Preschool

During the 1976-77 and 1977-78 academic years, a total of fifty children from the longitudinal study sample attended the Child Development Preschool. The short-term effects of this participation are reported elsewhere (Child Development Research Group, 1978). Children enrolled in the preschool maintained their initial levels of overall intellectual precocity as measured by the Stanford-Binet. Their academic skills, as measured by the Peabody Individual Achievement Test, were advanced at the beginning of each school year and progressed sufficiently during the year to maintain a constant degree of advancement. During both academic years, the difference between the group's mean PIAT age-equivalent score and the group's chronological age remained at about two years. In other words, the typical 3-year-old in the group was performing at the norm for 5-year-olds and the typical 4-year-old performed at the norm for 6-year-olds. Individual gains in academic skills varied widely, as might be expected in a program designed to adapt to individual children's levels of accomplishment and interest rather than to set uniform goals for the group.

Parent satisfaction with the program has been consistently high. In 1977-78, parents of children attending the Child Development Preschool

reported a higher degree of satisfaction with the academic program than did parents of children attending other preschool or kindergarten programs. Parents also expressed a high degree of satisfaction with the social and emotional experiences encountered at the preschool, but their responses to this question were not significantly more positive than the responses of parents whose children were attending other programs (Child Development Research Group, 1978).

Another effect of participation in the Child Development Preschool that might have long-term implications is the fact that a significantly higher proportion of children who have taken part in the program have gone on to enrollment in special programs for gifted children than is the case for children in the study sample who did not attend the Preschool.

Individual Progress Program

Establishment of a comprehensive kindergarten through twelfth-grade educational program for intellectually advanced children has been one of the primary goals of the Child Development Research Group. During 1977-78, substantial staff time was devoted to facilitating the establishment by the Seattle Public Schools of an accelerated program for extremely able students. This program was conceived as one which would permit these students to complete the K-12 sequence in substantially less than the usual thirteen years. Members of the project staff encouraged parents in the longitudinal study sample to support the development of this program. (See Appendix A5.) Parents responded by contacting school district and state education officials, and contributing many volunteer hours to the development of the program.

By early 1978, officials of the Seattle Public Schools had become publicly committed to the idea of an accelerated and enriched program for highly able students. The program was designated the Individual Progress Program and was, for practical reasons, limited during the initial year to students of first through fifth grade age. Members of our project staff, working in close collaboration with staff members of the Seattle School District, prepared a Title IV-C grant request to obtain supplementary program development funds.

The proposal was rated highly by a review panel, but State officials responsible for disbursing federal IV-C funds did not approve it. The superintendent of the Seattle Public Schools protested this decision, and members of our project staff served as consultants during the preparation of the District's appeal. In October 1978, the District's appeal of the Title IV-C decision was granted, and approximately $50,000 in program development funds were allocated to the project. The availability of these funds should do much to ensure that the program offered this year will be an excellent one, and that it will continue in future years.

During the summer months, identification of children for the Individual Progress Program was carried out by District personnel, who coordinated this process with the identification of children for Seattle's other "Horizon" programs for gifted and talented children. Members of our project staff contributed to the identification process by supplying, with individual parents' consent, test information available in our files.

Current plans call for gradual expansion of the Individual Progress Program to provide a complete elementary, middle and high school program. At present, the program is housed in an elementary school and serves approximately sixty students of first- through fifth-grade age. About one-third of this group are children who have participated in some aspect of our longitudinal study or related service programs. Of the fifteen 6-year-olds, six are former Child Development Preschoolers. We expect that the existence of the Individual Progress Program will provide a critical link in the comprehensive educational system for intellectually advanced children envisioned in our 1976 grant proposal.

Early Entrance/Optimal Match Program

During 1977-78, a program of early admission to the University of Washington for qualified students of junior high school age was expanded from two part-time students to fourteen students, of whom eight were part-time and six were full-time. Another fourteen students qualified for the program by earning high scores on the Washington Pre-college Test, but chose not to attend. Qualified applicants ranged in age from 9 years, 4 months to 14 years, 5 months;

the youngest student to enter the program was aged 11 years, 8 months and the oldest was aged 14 years, 5 months.

A paper in Appendix D (Robinson, 1978) provides more complete information about the first full year of this program. Most of the students have performed very well academically, and have chosen to continue in the program. We expect the program to continue and, within a few years, to provide the last link in our comprehensive education program for intellectually advanced students.

Group I: The Extraordinarily Precocious Children in 1978

Definition of the Group

While the longitudinal study is providing a wealth of information about a broad range of children who are to some degree intellectually advanced, a group of primary interest is composed of children who have demonstrated extraordinary intellectual precocity. Extraordinary precocity has been defined as performance four or more standard deviations above the mean and/or performance at least at the norm for children twice the tested child's age on any of several measures of general or specific intellectual or academic abilities. Extraordinary precocity has been determined by children's performance on the Stanford-Binet Intelligence Scale (Terman & Merrill, 1973), the Block Design and Mazes subtests of the Wechsler Preschool and Primary Scale of Intelligence--WPPSI (Wechsler, 1967) or the Wechsler Intelligence Scale for Children - Revised--WISC-R (Wechsler, 1974), the Numerical Memory subtest of the McCarthy Scales of Children's Abilities (McCarthy, 1972) and the Mathematics, Reading Recognition, and Reading Comprehension subtests of the Peabody Individual Achievement Test--PIAT (Dunn & Markwardt, 1970).

Establishment of classification criteria for measures other than the Stanford-Binet has been complicated by such problems as the total absence of age-appropriate norms for 2-, 3-, and 4-year-old children (in the case of the PIAT and WISC-R), norms extending only to three standard deviations above the mean (WPPSI subtests), or the need to estimate individual subtest norms (McCarthy Scales). In the case of all measures other than the Binet, therefore,

extraordinary precocity was defined as either performance at the norm for children twice the age or more or performance four or more standard deviations above the mean. In some cases, only one type of score has been available. When both types of score could be computed, we have adopted the convention of classifying the child by whichever score yields the classification of greater precocity. Since the ratio and deviation criteria often yield discrepant classifications, this system maintains a positive bias. Later revaluation of the classification system using alternative criteria will be possible.

Composition of Group I

Group I consists of 53 children, 21 girls and 32 boys[2]. Forty-nine of the children are Caucasian, 2 are Asian, and 2 come from mixed racial backgrounds. Two of the children are twin sisters, two are brothers, and two (both boys) are first cousins. Several other Group I children have siblings who are not in Group I, but who are part of the longitudinal study sample.

The oldest child in the group was born in November 1970, and the youngest was born in January 1976. The children currently range in age, then, from 2 through 7 years. Most of the children were born in 1972 (n=16), 1973 (n=10) or 1974 (n=12). Approximately half of the group is now of kindergarten or primary school age.

As is the case in the longitudinal study sample as a whole, first-born children are heavily represented. Forty-one of the Group I children are the oldest in their family, 8 are the second-oldest, 3 are third oldest, and 1 is fourth oldest.

Parents of Group I children are, on the whole, very highly educated. Eighteen of the fathers and 6 of the mothers had earned Ph.D. or equivalent degrees at the time their children entered the longitudinal study sample. In fact, the Ph.D. or equivalent was the modal education level for fathers of Group I children (n=18),

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[2]This group includes 7 children, 6 boys and 1 girl, who were identified through the project's Diagnostic and Counseling Service rather than through the standard longitudinal study procedures. Possible differences between this small group and the rest of Group I are noted as necessary in the discussion of individual analyses.

closely followed by fathers with M.A. or equivalent degrees (n=16). The M.A. or equivalent was the modal education level for mothers of children in this group (n=15). The lowest education level reported was a high school diploma for the father and mother of one child.

Project staff members have long suspected that the parents of children extraordinary in spatial ability might be somewhat less well educated than the parents of those extraordinary in Stanford-Binet IQ. The data reported in Table 3 indicate that there was definitely a trend in this direction, for both fathers' and mothers' education levels.

TABLE 3

Distributions of Parent Education Levels for High-IQ and High-Spatial Children

		Frequency					
		Some College	BA/BS	Some Graduate Work	MA/MS	Ph.D. M.D. J.D.	TOTAL
FATHER'S EDUCATION LEVEL	High IQ Group	1	1	3	3	4	12
	High Spatial Group	3	2	1	1	0	7
MOTHER'S EDUCATION LEVEL	High IQ Group	2	3	2	4	0	11
	High Spatial Group	4	2	0	1	0	7

NOTE: Father's education level was not available for one high-IQ child, and mother's education level was not available for two high-IQ children.

The most appropriate test of our hypothesis would have been a chi square test of differences between the distributions for parents of the two types of children. Since expected values for individual cells of the frequency distributions were too small to permit this

analysis, parent education levels were reclassified into two categories at the boundary which would produce the most even division for the total sample of mothers and fathers. This reclassification split parents into a group who had not pursued education past the B.A. level, and a group with at least some postgraduate education. Fathers of high-IQ children were significantly more likely than fathers of high-spatial children to have attended graduate school (Fisher's exact test, $p<.05$). There was no significant difference between the two groups in the distributions of mothers' education levels. More extensive analyses of the relationship between parent education levels and patterns of ability within the extraordinarily precocious group and the sample as a whole are planned for the coming year.

Almost all of the children live in the greater Seattle metropolitan area. One child, a Diagnostic and Counseling Service case who lived in another state at the time of his entry into the longitudinal study sample in January 1976, still lives out of the state. Three other Group I children have recently moved away from the Seattle area. The project staff remains in close contact with all of these families.

One child, a boy who qualified as extraordinarily precocious in memory at the time of his initial assessment in the summer of 1976, was withdrawn from the study sample at the request of his parents, who did not feel that they had enough time to continue their involvement with the study. He has been excluded from all analyses reported here.

Test Performance

Children have qualified as extraordinarily precocious at every age from 2 through 6 years. Some children have met one or more of the criteria for inclusion in this group the first time they were tested, while others joined the group at a second, third or fourth assessment. To date, there have been four testing periods during which a child might be classified. The first classification period spanned a series of tests administered from early 1975 through the fall of 1976, the second classification was based on tests administered

during the spring and summer of 1977, and the third and fourth classifications were based on tests administered in the fall of 1977, and the spring of 1978, respectively. Few of the Group I children have been tested during all four of these testing periods, but the majority have now been tested at least twice.

TABLE 4

Total Instances of Extraordinary Precocity: 1975-1978

Area of Extraordinary Precocity	Frequency		
	Girls	Boys	Total
Stanford-Binet IQ	9	8	17
Spatial Reasoning	1	10	11
Memory	8	14	22
Reading	6	13	19
Mathematics	2	2	4

NOTE: Since many children have demonstrated extraordinary precocity in more than one area, the figures in this table sum to more than the total number of children in Group I. Patterns of interrelationship among ability areas are discussed in the text.

Table 4 summarizes instances of extraordinary precocity documented to date. Children qualifying as extraordinarily precocious in more than one area are represented in each area of qualification, but repeated qualification within a single area has been counted only once.

Perhaps the most striking feature of Table 4 is the sex difference in the incidence of extraordinary spatial reasoning ability. We know of no overt bias in our data collection procedures which could be responsible for the much greater incidence of extraordinary

precocity in spatial ability among boys. It is possible, however, that parents of girls precocious in spatial reasoning ability might be less likely than parents of boys with similar abilities to nominate their children for a project such as ours. The less extreme imbalance between the sexes in the incidence of extraordinary precocity in reading might be an artifact of the high proportion of Diagnostic and Counseling Service cases represented in that category. Six of the 19 precocious readers, 5 of them boys, joined the longitudinal study sample through participation in this service. Since the incidence of extraordinary precocity in reading within the longitudinal study sample proper is more evenly divided between the sexes (5 girls and 8 boys), it is possible that this apparent sex difference at least partly reflects a differential tendency for parents to seek educational guidance for preschool-aged boys who are advanced readers.

The relatively high incidence of extraordinary precocity in memory may be attributable to the nature of the criteria for precocity in that realm. Our ratio criterion and our deviation criterion often yield strikingly discrepant classifications for short-term memory performance. A child aged 4 years, 0 months who can repeat a series of three digits reversed, for example, is <u>not</u> performing at the norm for 8-year-olds, but <u>is</u> performing at a level more than four standard deviations above the mean for his or her age group. Conversely, a 2-1/2-year-old who repeats a forward sequence of four digits is performing at a norm for 5-year-olds but less than three standard deviations above the mean for 2-1/2-year-olds. Since children are awarded the higher classification in the case of any discrepancy between these two standards, extraordinary precocity may be somewhat easier to earn in the memory category.

The relative rarity of extraordinary precocity in the mathematics area deserves mention. This might be to some extent an artifact of the measures used. Although a child can qualify as extraordinarily precocious in mathematics by performance on the WPPSI/WISC-R Arithmetic subtest, none has yet done so. Our primary criterion for extraordinary precocity in mathematics has been performance on the Mathematics subtest of the PIAT. Since this test has not been

normed for children below the age of 5 years, and those deviation norms that are available cover only a limited range, we have relied solely on a ratio criterion for classifying children's performance on this test. We have yet to find a child below the age of 5 years who performs at or above the third grade or the 8-year level on this measure. One girl did qualify as extraordinary in mathematics by performing at the norm for children aged 80 months when she was 39 months of age. The other three instances of precocity in this area were obtained by children aged 5 or 6. As the study progresses and the children grow older, we expect to find many more instances of extraordinary ability in mathematics and to be able to trace the psychometric antecedents of this ability.

The relationship between extraordinary precocity in one ability area and comparable ability in other areas is best discussed from a longitudinal perspective, to be presented in the section that follows. It should be noted, however, that some individual children in Group I have simultaneously met the criteria for extraordinary precocity in up to four areas. Children qualifying in memory have been the group least likely to show extraordinary precocity in any other area, while every child qualifying in mathematics has also qualified in another area.

While the Stanford-Binet IQs of the Group I children vary across a wide range, the group as a whole has earned very high scores on this measure of general intellectual ability. As of September 1978, the most recent Stanford-Binet IQs of Group I girls ranged from 115 to an estimated 179 with a mean of 152.8. The boys' IQs ranged from 121 to an estimated 182 with a mean of 148.0.

Longitudinal trends in patterns of extraordinary precocity: Within Group I are 24 children, 9 girls and 15 boys, who were tested for the first time in 1975 or 1976, and retested at least once in 1977 or 1978. Inspection of longitudinal patterns in the test performance of these children confirms that extraordinary precocity demonstrated during the preschool years is not likely to be a fleeting phenomenon, that instances of such precocity increase as children grow older and are repeatedly tested, and that precocity in a particular dimension may predict precocity in other dimensions as well as, or instead of, continued excellence in the original area of strength.

The 24 Group I children tested during both periods can be subdivided into three groups: 8 children who qualified as extraordinarily precocious during both periods, 4 who qualified during the first but not the second period, and 12 who failed to qualify for this group in 1975-76 but did do so in 1977-78.

Table 5 indicates the types of extraordinary precocity demonstrated during the two periods for those children who maintained their exceptional precocity. At the time they first qualified for Group I, these children ranged in age from 2 years, 11 months to 4 years, 5 months, with 6 of the 8 qualifying at age 3.

TABLE 5

Area(s) of Extraordinary Precocity for Children Maintaining Extraordinary Status

Sex of Child	Area(s) of Extraordinary Precocity	
	1975-76	1977-78
M	Spatial Ability	Spatial Ability and IQ
M	Reading	Mathematics
F	Reading and IQ	Reading and IQ
F	Mathematics	Memory
M	Reading	Reading
M	IQ	IQ and Mathematics
M	Reading and IQ	Reading
M	Reading	Spatial Ability

Table 5 clearly suggests that measures other than Stanford-Binet IQ can be useful as predictors of extraordinary precocity. The frequency with which other predictor indices are listed is particularly noteworthy since the Stanford-Binet was the only measure administered to the entire longitudinal study sample prior to the summer of 1976.

What about the four children who qualified as extraordinarily precocious in 1975-76 but did not maintain this status in 1977-78? These 4 children, 3 boys and 1 girl, also varied in their areas of initial precocity. One boy qualified as extraordinarily precocious in spatial ability, one in memory, and another in both memory and reading skill; the single girl had an initial Stanford-Binet IQ extrapolated well above the scale limits. To date, none of these children has declined in performance to an alarming extent. The boy initially extraordinary in memory recently earned a Stanford-Binet IQ of 163, a single point below the criterion for Group I. The boy who initially qualified for Group I in the reading and memory categories was in Group II (ratio of test age to chronological age 1.75 and/or performance 3 standard deviations above the mean) in reading, memory, and mathematics performance when last tested in the spring of 1977. The high-IQ girl's best performance when retested in 1977 was still in the area of IQ, but her score was a somewhat more modest 157. The boy who initially qualified as extraordinarily precocious in spatial ability later earned Group II status in both spatial ability and mathematics skill.

The group of 6 boys and 6 girls who did not qualify for Group I at initial testing, but did do so later includes girls whose testing in 1975-76 was limited to administration of the Stanford-Binet, on which they earned scores in the average range. Three of these girls later earned IQs above 164, and two of the three were also extraordinarily precocious in reading skill. The fourth had a later IQ of 157, extraordinary memory, and Group II reading skills. Thus, it is possible that our failure to assess reading skills as part of our longitudinal study procedures prior to 1976 deprived us of a very early opportunity to identify some extraordinarily precocious children. The same argument cannot be made regarding the remaining cases in this group. All of these children were administered measures of ability in all of the criterion areas at least once during the 1975-76 period, with the exception of one boy who was not given the memory tests. Overall, the change in the performance of these children over time might best be described as improvement from excellent to extraordinary performance. Since 7 of these 8 attended the Child

Development Preschool for at least two years, their improvement might be partially attributable to the effect of practice from the more repeated testing given this group, to simply having more opportunities to perform above the criterion, to the Preschool curriculum, or to some combination of these factors.

In summary, we have found that those children identified as extraordinarily precocious at a very early age have maintained a substantial degree of precocity over a period of several years. No single index of precocity has yet proved more powerful than the others in our battery as a long-term predictor of intellectual or academic excellence.

Educational Experiences of Group I Children

During the 1977-78 school year, 22 children in the extraordinarily precocious group were 5 or 6 years old and were enrolled in kindergarten or primary level programs. The types of programs in which these children were placed are summarized in Table 6. Over half of the children (12 of 22 cases) were enrolled in private school programs; however, 6 of the children attending private kindergartens were expected to attend public elementary schools in 1978-79.

TABLE 6

1977-78 School Placement of Extraordinarily Precocious Children (n=22)

	Frequency		
Type of Program	Girls	Boys	Total
Child Development Preschool/Kindergarten	2[a]	3	5
Private school for gifted children	1	2	3
Miscellaneous private schools	0	4	4
Public school full-time acceleration and/or enrichment	1	3	4
Public school program, modified with part-time acceleration or enrichment	2	2	4
Standard public school program	1	1	2

[a]One girl listed in this category moved to another state in January 1978 and completed the school year in a public school program that offered her full-time accelerated status and a part-time enrichment program.

In Table 6, part-time acceleration describes a program in which the child's primary placement is in the age-appropriate grade, but some time is regularly spent with a group of older children. For instance, a kindergartener might spend afternoons in the first grade rather than going home at noon, or a first-grader might take reading instruction in a third grade class. Full-time acceleration describes a situation in which a child's entire day is spent with older children, and this advanced placement is reflected in school records. A full-time accelerate might be a child who entered first grade rather than kindergarten at age five, or one who "skipped" a grade at some time after school entrance.

Contacts with the parents of these 22 children during or just after the 1977-78 school year yielded reports of the children's school progress and adjustment. Without exception, the children were reported to be performing well academically. However, many parents expressed dissatisfaction with the academic stimulation and/or social experiences their children had encountered.

According to their parents' reports, only two of the children attending public schools, both of them kindergarteners, did not participate in any regularly scheduled special or individualized program. The other eight public school students participated in advanced classes on either a full- or part-time basis, were given some individual tutoring, or took part in a full- or part-time program for gifted children.

Comments from parents of children attending the Child Development Preschool/Kindergarten or private school for gifted children were consistently positive. Parents were generally very well satisfied with both the academic programs and the social and emotional experiences offered by these two schools. Two extraordinarily precocious 1977 graduates of the Child Development Preschool/Kindergarten have enrolled in the Individual Progress Program for 1978-79.

Parents of the four children enrolled in regular private school programs gave mixed reviews. One parent gave a glowing report of the "sensitive" handling and academic stimulation afforded her child. Parents of the other three children expressed concerns about the lack of academic challenge and/or their child's difficulties in establishing

close friendships with classmates. Two of the four children in this group have been enrolled in the Seattle Public Schools' Individual Progress Program for 1978-79.

Parents of children attending full-time special public school programs tended to be generally satisfied with their children's school experiences, although a desire for more challenge was expressed by almost all of them. One girl in this group has transferred to a private school for gifted children for the 1978-79 school year, and two boys have transferred to the Individual Progress Program. The parents of one full-time accelerate moved during the school year to a rural district which offers no special programs. They are considering hiring a tutor to supplement their son's education since they fear that even continued placement with a group of children one year older will not, in that district, offer sufficient challenge.

The most negative reports have come from parents of children who attended standard public school programs or programs with some part-time modification. While three children seemed to be doing very well in this type of situation, parents of the remaining three children, two of them enrolled in standard programs and one part-time accelerate, reported serious problems. The parents' remarks recall Leta Hollingworth's (1942) catalog of the problems facing children who are intellectually advanced far beyond their chronological peers:

> "No intellectual stimulation...very good (social) adjustment in kindergarten class, uneven success in third grade (reading) class socially--only in class about 90 minutes a day, never integrated into group socially--likes and enjoys other children, however, she tends to be bossy and over-bearing. She hated being singled out--the only child in kindergarten who had to go to another grade level part of the day...It would help if there were at least a few other children like herself around her. If anything, she has gone backward rather than forward this year due to lack of stimulation and opportunity."

> "He learned nothing new academically at school this past year ...(He) is very competitive and hard-driving by nature, and it has not been good for him to be always #1 Top Banana in

thing academic...(He) was definitely a leader in his kindergarten class, and he loved rowdy team games at recess. He was always captain...(He) has several children he calls constantly and invites over often. Their parents are definitely discouraging his friendships, I feel...After a first visit, he is not invited back...He has a real need to be with people as able as himself. His greatest need now is HUMILITY, and a sense of perspective about himself."

"She is very bored with school and says so. I keep telling her it gets better...She relates harmoniously at school--no fights, etc. Does tend to want to dominate her own age and usually succeeds...Only weakness in her adjustment to school is that she doesn't like it. She does her work, participates in class, relates, etc., so that others wouldn't realize this, but <u>loves</u> a chance to stay away from school."

The mother of this last child stopped by the project office during the summer months, and mentioned that she had found her daughter crying in bed one night. When asked what was the matter, the child replied that she had been able to sit through half-day kindergarten class but didn't know how she could possibly endure going to school for a full day every day.

One of these three children has transferred to the Individual Progress Program. Parents of the other two expressed interest in the program but decided not to enroll their children. Both of these families live a considerable distance from Seattle.

Although the experiences of three children attending regular or part-time modified public school programs have been unhappy, it is important to note that other children with highly similar abilities attending similar programs were quite happy at school. For instance, a boy whose precocious reading skill was comparable to that of the girl described in the first quotation above smoothly mastered a mid-year transition from a standard kindergarten program to a placement split between his kindergarten and the third grade. Our sample of extraordinarily precocious children with particular school histories

is not yet large enough to permit us to speculate on why a program that worked with one child failed with another. Trends should begin to emerge as the children who are now of preschool age complete kindergarten.

In summary, we have found that extraordinarily precocious children in our longitudinal study sample are likely to participate in some sort of special education program at a very early age. As we have noted earlier, participation in our study might in itself have made the parents more aware of the various options available to gifted children and facilitated their children's access to these programs. Whether or not parents report satisfaction with an extraordinarily able child's school program does not, at this point, appear to be related to the child's particular pattern of abilities.

Summary and Future Plans

Now that the identification phase of our longitudinal study is drawing to a close, several preliminary goals of the study have been accomplished:

- --a large sample of extremely able children has been identified
- --relationships between young children's intellectual abilities as described by parents and as demonstrated on standard tests have been defined
- --intellectually precocious children of preschool age have been described in terms of a broad range of intellectual, social and personal characteristics
- --concurrent and longitudinal interrelationships among specific intellectual abilities are beginning to emerge
- --the early educational experiences of intellectually advanced children are being documented
- --a coordinated sequence of accelerated educational programs extending from preschool through college and designed to serve children with extremely advanced intellectual abilities has been established.

Specific research efforts expected to yield publishable results in the coming year include an analysis of the data we have concerning the predictive significance of parents' reports of their children's

abilities; a set of analyses and experimental procedures designed to define the intellectual characteristics of children classified as high in either verbal or spatial reasoning ability; a comprehensive report on the backgrounds, interests and intellectual characteristics of early readers, and a description of the social and emotional characteristics of intellectually advanced preschoolers.

Overall descriptions of the longitudinal study are scheduled to appear in a chapter of the 1979 NSSE Yearbook (Robinson, Roedell & Jackson, in press) and in a monograph on the preschool gifted child to be published by Columbia University Press (Roedell, Jackson, & Robinson, in press).

During 1978-79, project staff members will concentrate their efforts on preparing these publications, continuing to follow children in the longitudinal study sample, and developing the procedures that will be used during the next phase of the longitudinal study. Summaries of current findings and plans for the "middle childhood" phase of the longitudinal study will be included in a request for further funding of the study which will be submitted to the Spencer Foundation and other sources in the early spring of 1979.

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APPENDIX A1

Child Development Research Group
1977-78 Project Staff Members

Members

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Philip Dale, Associate Professor of Psychology and Linguistics
Ellis Evans, Professor of Education
Nancy Jackson, Research Coordinator and Research Assistant Professor
Benson Jaffee, Professor of Social Work
Clifford Lunneborg, Associate Professor of Psychology and Director of Educational Assessment Center
Wendy Roedell, Education Coordinator and Research Assistant Professor

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Elisabeth Bell, Community Liaison
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Joy Menke, Head Teacher
Carolynne Davis
Claire Fitzgerald-Leary
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Randall Katz
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Jacqueline Gramann

CHILD DEVELOPMENT PRESCHOOL

Child Development Research Group
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and

Nancy E. Jackson, Ph.D.

Research Assistant Professors

HEAD TEACHERS

Anne S. Hall
Joy Menke

PROGRAM ASSISTANT

Marti Sivertson

Child Development Preschool

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university of Washington

PROGRAM DESCRIPTION

The Child Development Preschool is part of a long-term study of the development of children with unusually advanced intellectual abilities. The individualized program is designed to foster optimum development of each child's unique capacities.

A variety of learning experiences are offered in a balanced mixture of teacher- and child-structured situations. The program includes individualized instruction in language arts, science, mathematics, and social studies. Art, music, and drama are also integral parts of the curriculum. Daily outdoor activities allow children to develop self-confidence and coordination in active play. Considerable emphasis is placed on helping children acquire the social sensitivity and interpersonal skills which will allow them to participate comfortably in different social situations.

RESEARCH ACTIVITIES

Since the preschool is part of a research project, children occasionally leave the classroom to participate in individual test sessions. Research activities are designed to be enjoyable experiences for children and are limited so as not to interfere with the classroom program. Parents may decline to have their children participate in any particular activity.

IDENTIFICATION SYSTEM

Applicants are carefully screened to insure that every child enrolled will feel comfortable in a program designed for children with advanced intellectual abilities. The selection process involves several steps, beginning with the consideration of written information from parents.

Final evaluation of selected applicants is based on a comprehensive profile of the applicant's interests and abilities as reflected in information from parents and scores on standardized tests. Some children qualify for the program by demonstrating generally advanced intellectual ability. Others qualify on the basis of unusually advanced abilities in specific areas, such as reading, drawing, memory, or spatial reasoning.

Final decisions on enrollment reflect the school's need to preserve a balance of ages and sexes in the program, to serve children from diverse ethnic backgrounds, and to enroll a group of children whose superior intellectual talents lie in a variety of domains.

A child must be at least two years of age and toilet trained to be considered for the program. Applicants for each year's program are screened during the spring of the preceding year. Completed applications must be received by March 1 to insure consideration of a child for the following year's program.

HOURS AND FEES

The morning preschool program runs daily from 8:45 to 11:15 a.m. for eleven weeks during the fall, winter and spring academic quarters. A mid-morning snack is served.

A school-day program (8:45 a.m. to 2:15 p.m.) is offered for older children who do not nap and who are ready to benefit from additional time in school activities. Children bring lunch. Hot soup and milk at lunchtime and a mid-afternoon snack are provided by the school.

Operating costs of the program are provided by parent fees, supplemented by grants from the U. S. Office of Education and the Spencer Foundation. Fees are determined on a sliding scale based on family size and income. Full-scale fees are $229 per quarter for the morning program, $450 per quarter for the school-day program.

TRAINING AND DISSEMINATION

The Child Development Preschool is a Model Program of the U. S. Office of Education, Office of the Gifted and Talented. Written materials describing all aspects of the program are available on request. A small fee may be charged to cover reproduction and mailing costs. Visitors are welcome and appointments for observation in the classroom can be made by calling 543-4160.

APPENDIX A3

CHILD DEVELOPMENT RESEARCH GROUP

Diagnostic and Counseling Service

Director:

Halbert B. Robinson, Ph.D.
Professor of Psychology and Chairman,
Child Development Research Group

Address:

Guthrie Annex II, NI-20
University of Washington
Seattle, Washington 98195

Purpose

The purpose of the Diagnostic and Counseling Service is to help parents of children with advanced intellectual abilities to understand the nature of their children's abilities and to make informed decisions about educational placement. The service is associated with a continuing program of research in child development. It is appropriate for children aged 2-1/2 to 12 years.

Services

Services include comprehensive testing of a child's intellectual and academic abilities and information about educational options in the Seattle area. Assessment and counseling usually require two or three family visits to the University of Washington campus, but services may be adjusted to meet the specific needs of individual families. Information gained from testing the child and talking with the family is summarized in a written report which is discussed in a final consultation session. Parents may request that we seek input from school personnel or other sources as part of the counseling process.

Staff

The service is staffed by University faculty and graduate students associated with the Child Development Research Group. All cases are reviewed by the director before the final consultation with parents.

Confidentiality

All records are confidential. Reports are given directly to parents. Information about a child may be shared with schools or other agencies at the request of parents.

Research

Since the Diagnostic and Counseling Service is operated in conjunction with a longitudinal study of children with advanced intellectual abilities, parents are asked for permission to have information from their child's records summarized and included in research puglications. Such research use of information fully preserves the anonymity of the child and family. Any family may decline, without penalty, to have their child's records included in the research project.

Fees

The standard fee is $50.00. Fees are adjusted on a sliding scale related to family income.

Further Information

Questions concerning the Diagnostic and Counseling Service and requests for appointments may be made by contacting Marti Sivertson at (206) 543-4160.

APPENDIX A4

News Services
University of Washington
Seattle, Washington 98195
(206) 543-2580

FOR EDITORIAL INFORMATION
from
FRED CORDOVA, Manager
Home: (206) 324-9011

Editors, Education and Science Writers:

1978 STUDY OF YOUNG CHILDREN WITH ADVANCED INTELLECTUAL ABILITIES

by Dr. Nancy E. Jackson

Parents who think that their preschool-aged child is unusually bright are probably correct.

One of the initial findings of a long-term study of children with advanced intellectual abilities now under way at the University of Washington has been the demonstration that asking parents to nominate their own children for the study is a very efficient way to collect a large group of very bright children. Generally, the results of standard test sessions confirm evaluations of a child's intellectual abilities which have been made on the basis of information from parents.

It is hoped that parents will decide in favor of their family participating in the U.W.'s longitudinal study of young children with advanced intellectual abilities, being conducted for several years by the Child Development Research Group under the auspices of the Graduate School.

The research project is directed by Dr. Halbert B. Robinson, Professor of Psychology and Chairperson of the Child Development Research Group and a faculty member since 1963. The long-term study and related service programs are funded by grants from the Spencer Foundation in Chicago, the Office of Gifted and Talented of the U. S. Office of Education, and the Ford Foundation.

A model preschool program for intellectually advanced children is associated with the research project. It is known on the U. W. campus as the Child Development Preschool.

Young children may demonstrate their remarkable intellectual abilities in a variety of ways. Some children begin to speak in complex sentences before they are two. Some teach themselves to read and write by the age of three. Others show an early interest in complex

jigsaw puzzles while still others develop an early ability to draw representational pictures. Sometimes a child will show an unusually early fascination with the number system. When asked whether their child could recognize and name two-digit numbers, the parents of one 5-year-old replied, "Yes, he only starts losing track when numbers get into the 10,000's."

Parents of children aged 2 through 5 years who would like to participate in the long-term research project or apply to the model preschool program, should call the project office at (206) 543-4160 to request an application form. The application must be returned by March 1 in order for a child to be considered for the 1978-79 preschool program.

All inquiries may be directed to Dr. Nancy E. Jackson or Dr. Wendy C. Roedell, both educational research coordinators in the study and research assistant professors.

Parents who participate in the study are asked to complete a questionnaire describing their child's current interests and accomplishments. Beyond this point, parents may be invited to bring their child to the project office for individual test sessions or to keep in touch by mail as their child grows up. The project staff is available to answer parents' questions about the special difficulties of raising an unusually bright child and to supply information about community resources.

At present, no one is certain of the long term implications of extraordinary intellectual precocity during the preschool years.

As the project continues, Dr. Robinson and his colleagues hope to keep in touch with all the families in their study and record how patterns of abilities change over the years, how the children fare socially and emotionally as well as intellectually, and how different kinds of school experiences affect the development of intellectually precocious children.

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APPENDIX A5

Child Development Research Group
University of Washington
Guthrie Annex II, NI-20
Seattle, Washington 98195
Telephone: (206) 543-4160

December 15, 1977

Dear Parent:

Staff members of the Child Development Research Group are working with Seattle Public School officials to develop a proposal for a special kindergarten through twelfth grade program which would be specifically designed to serve children with extraordinarily advanced academic abilities.

We are writing to all families who are part of our long-term study of children with advanced intellectual abilities or who have participated in one or another of our various educational service programs to ask if you might be interested in contributing your ideas to the development of this proposal.

The program we envision would be open to children from all parts of Seattle and, space permitting, to children from neighboring districts. The program would be highly individualized to permit each child to progress at his or her own rate in each academic area. All of the children would be selected for extremely advanced skills in one or more academic area(s) and/or for extraordinary general intellectual ability.

The program would differ from the current Horizon programs in its emphasis on the extraordinarily able student and in its philosophy of fostering student-paced progress more rapidly than their interests and abilities warrant. The program would, in fact, encourage the children to study broadly and in depth, rather than just to pass quickly through the established curriculum. Nonetheless, we expect that many of the children would complete a substantial portion of their high school work by the age of twelve or thirteen. At this point, students would have a variety of options, including advanced placement courses within the public schools, courses at local colleges and universities, etc.

We see the school as offering several advantages to the exceptionally advanced student. Since there would be many such students in the program, children with unusual abilities would have the advantage of working with other children of approximately the same age who

share their advanced abilities and interests. The program's commitment to individualized programming would also accommodate the unevenness of abilities which characterizes many exceptionally able students. A child might, for example, be working with the school's most advanced students in math and science while studying reading and social studies with a less advanced group. The program would be served by a specially trained counseling staff charged with responsibility for working with each student to develop the most appropriate program possible.

The group would undoubtedly be diverse in ethnic and economic background, as well as in personalities, interests, and specific abilities. The Child Development Research Group's experience with its model preschool/kindergarten program has demonstrated that children selected for intellectual precocity are not a homogeneous group. The school would also foster interactions between its students and a broad range of other children through cooperation with other schools and community groups.

We realize that not every family receiving this letter would be interested in having their child attend a program such as we have outlined. Indeed, we would not expect that all of your children would prove to have the exceptionally advanced abilities that would be required for admission to the program. Nonetheless, we wanted all of you to know about our plans and to have an opportunity to express your reactions.

Your responses to the questions on the enclosed, stamped postcard will help us determine the extent of parents' interest in the program we are proposing. We would appreciate your returning the card to us, no matter what your reactions are.

One question on the card asks if you would be interested in attending a meeting to help develop the program we have proposed. This meeting will be devoted to organizing a parent advisory group and defining the issues that the group will address. Parents may wish, for example, to have a voice in establishing the size and location of the school, setting its educational priorities, and so on. This meeting will take place Wednesday, January 11, at 7:30 p.m. Unless we notify you to the contrary, you can assume that the meeting will be held in the same building as our preschool and research offices, Guthrie Annex II. As many of you know, the building is near the N.E. 40th Street and 15th Avenue N.E. entrance to the University campus.

We could not find room on the enclosed card to provide space for your suggestions or questions regarding the proposed program. As always, we would be happy to have you write or call our office to ask

for further information or to give us your comments and suggestions. Our telephone number is (206) 543-4160.

We should warn you that planning for this program is still in its very early stages. Neither we nor the Seattle Public Schools' personnel who are working with us have information that is much more specific than that which we have given you in this letter. Our hope is that many of you will want to work with us as our general concepts are transformed into an actual program.

Sincerely,

Halbert B. Robinson, Ph.D.
Professor of Psychology and Chairperson,
Child Development Research Group

HBR/mw

Enclosure

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Publications and Conference Presentations

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APPENDIX B

Identification and Description of Intellectual Precocity in Young Children[1]

Paper presented in the symposium, Intellectually Advanced Children: Preliminary Findings of a Longitudinal Study, Halbert B. Robinson (Chair). Annual Convention of the American Psychological Association, Toronto, August 30, 1978.

Nancy Ewald Jackson

One of the major long-term goals of our longitudinal study is to establish the predictive significance of varying degrees and patterns of intellectual precocity demonstrated during the preschool years. Since the oldest children in our longitudinal study sample are now just 6 or 7 years old, we do not yet have data documenting the long-term implications of assessment made during the preschool years. We have, however, begun to answer three important questions about patterns of intellectual performance during the period between 2 and 5 years of age. Our first goal was to determine the stability of intelligence measures obtained during the preschool years for a sample of intellectually advanced children. A second goal was to establish the extent to which predictions of intelligence during the preschool years could be improved by consideration of information

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[1]The research presented in this paper has been supported primarily by grants from the Spencer Foundation. Additional funds from the U.S. Office of Education, Office of Gifted and Talented (300-76-0441) and the Ford Foundation have supported related programs. The design and execution of the longitudinal study has been guided by Halbert B. Robinson, principal investigator, together with Wendy C. Roedell and the author, associate investigators. Major contributions to the study have been made by a number of graduate students, including Richard Krinsky, Stephen McClelland, and David Shorr. Charles Stillman has managed the longitudinal data file and executed all of the analyses presented here. The author is especially grateful to Clifford E. Lunneborg for his suggestions regarding these analyses and to Julian C. Stanley for his comments on an earlier draft.

other than test performance. Third, we wished to investigate the possibility that intellectual ability in precocious young children could be better described by a multi-factor than a single-factor model of intelligence.

Sample Characteristics

Before presenting our data, I would like to acquaint you with some of the characteristics of our sample. It is, first of all, a self-selected sample generated by publicizing our project throughout the greater Seattle area. Parents of preschool-aged children who thought their child might have advanced intellectual abilities were asked to contact our project office. Parents who responded to this publicity were mailed a questionnaire calling for objective and anecdotal information about their child's abilities and interests. With a few exceptions, all children whose parents returned this questionnaire were invited to participate in a standard test session and to continue participating in the longitudinal study.[2] Children have not been excluded from the longitudinal study sample because of poor test performance.

Table 1

The first table summarizes the background characteristics of the children in the four cohorts of our study sample. As you can see, all samples have been dominated by white, first-born children of very well-educated parents. However, while median parent education levels were high in all cohorts, each group included mothers and fathers who had ended their formal education at or before the completion of high school. The substantial year-to-year fluctuation in the ethnic composition of the sample probably reflects the differential effectiveness of each year's publicity in reaching minority groups. The last, and largest, cohort is

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[2] In 1978, the response to project publicity was so great that it was impossible to schedule all applicants for testing and further participation in the study. Some selections were made on the basis of parent questionnaire information and other factors.

probably more representative of the ethnic distribution of the Seattle area than are the others. Nonetheless, we do not wish to claim that this sample, as a whole or in any of its parts, is representative of the Seattle community in ethnic or economic distribution or any other background factor. A volunteer sample simply cannot be representative in this way.

We would expect the children in this sample to be above the national average in intellectual ability, simply by virtue of a social class bias in response to our publicity and parents' willingness to participate in a project of this nature. Our data indicate, however, that parents exercised considerable self-selection in volunteering to participate in this study.

Table 2

The second table summarizes the distribution of initial IQs for 153 2- to 5-year-old children in the last, and largest, cohort. Mean IQ for the children in this cohort was 130, a value typical of all cohorts. Scores ranged from 76 to 175 with a standard deviation of 18.3. The variation of IQ within this cohort was characteristic of all cohorts in the study sample. Although mean performance level has been consistently high, each year's cohort has shown a range in IQ as great as one would expect for an unselected sample.

Even though some of the children have not been remarkable in their initial or even in their later test performance, we consider all the children in the sample to be "at risk" for intellectual precocity because of their parents' decision to nominate them for this study. By following the development of all of these children, we give ourselves an opportunity that most investigators studying "gifted" children have not had--an opportunity to compare the ultimate performance of children whose exceptionality was certified at the time of initial screening with that of children who did not appear exceptional at that time.

The use of a wide range of intellectual performance levels within our sample also permits us to make comparisons between relatively more and less able groups--comparisons that would

otherwise require maintenance of a separate control group. Finally, maintaining a sample with a substantial range of performance on various intellectual measures facilitates the study of individual differences using correlational techniques.

Stability of Stanford-Binet IQ

During our pilot work, we found that children who seemed to be highly intelligent in every practical sense of the word did not always earn exceptionally high Stanford-Binet IQs when tested at the age of 2 or 3 years. Establishing estimates for the longitudinal stability of IQ within an intellectually advanced group became one of the first goals of our research.

Several alternative possibilities were suggested in the literature. Within the standardization sample for the Stanford-Binet (McNemar, 1942), high IQs for any given age group tended to be less reliable than low ones. Since reliability is a necessary precondition for predictive validity, we therefore might reasonably expect the IQs of intellectually advanced children to be relatively unstable over time. On the other hand, a common explanation for the instability of IQ during the preschool years is the fact that test items administered to very young children typically do not tap the same language and abstract reasoning abilities as do items administered to older children and adults. If the difference in items over the years is the primary determinant of longitudinal stability in IQ, then the IQs of intellectually precocious children should be more stable than those of their age-mates. After all, such children earn high IQs by passing test items typically administered to older children. Might not the IQs of intellectually precocious children be as stable, therefore, as the IQs of older, average-ability children who are passing the same test items?

We computed estimates of the stability of IQ for the largest available sample, 65 children who were administered the short-form (starred items only) or full-scale Stanford-Binet (Terman & Merrill, 1972 norms edition) for the first time at the age of 2 or 3 years and retested with the short-form at 4 or 5 years. All tests were

administered by graduate students trained and supervised by the project director or by a licensed psychometrician. In many cases, the first and second tests were given by different examiners. The examiner administering the follow-up test reviewed the child's records before beginning the test session.

The test-retest correlation for our sample was a modest .50, a value equal to or lower than those reported for Stanford-Binet test-retest correlations in other longitudinal studies (Bayley, 1949; Sontag, Baker & Nelson, 1958).

Clearly, the children's relative standings within the group changed substantially from first to later testing. In addition, we found that the amount of change in individual scores was often very large. The mean change in the group's IQ level was an unremarkable 4.8 points, from 131 to 136 IQ. The standard deviation of the difference scores, however, was 18.5 points. Figures for the means and standard deviations of year-to-year changes within the Fels longitudinal sample provide a convenient standard of comparison for evaluating these values. Between the ages of 3 and 4 years, the fifty children in the Fels sample showed a mean Stanford-Binet IQ gain of 1.74 points with a standard deviation of change equal to 6.16 points; mean change between 4 and 5 years was -1.50 with a standard deviation of 5.02 points. (Sontag, Baker & Nelson, 1958, p. 37).

Table 3

Table 3 illustrates the extent of IQ change within our sample. In this figure, differences between first and later IQs are shown blocked by intervals spanning 16 points of change. As you can see, the modal change was a loss of between 1 and 16 points, but extreme changes were more likely to be positive than negative in direction. Of the sixty-five cases in the test-retest sample, nineteen gained more than 16 points from first to later testing, while only five lost more than 16 points (chi square=12.28 with 1 df, $p<.001$). One child, a girl, gained 65 points from one session to the next. There was no relationship between sex and change in IQ (chi square= 3.88 with 6 df, NS).

As might be expected, the direction of IQ change was significantly related to the child's initial IQ level. Children whose initial IQs were below the sample median of 130 were more likely to show gains (n=24) than losses (n=8) on retesting, while children with initial IQs at or above the median were more likely to show losses (n=24) than gains (n=9). This relationship was strikingly symmetrical and highly significant (chi square=12.96 with 1 df, $p<.001$). This pattern suggests that the children's scores were indeed regressing on retest, but to a population mean close to the sample mean rather than to the 100 mean for the standardization population of the Stanford-Binet.

Two differences between the present sample and the other longitudinal studies might have contributed to the relative instability of our scores. One potentially critical difference is the use of the short-form rather than the full-range Stanford-Binet. We have no way of assessing the impact of using the short-form Binet for follow-up tests, but we did not find any difference in test-retest correlations between the groups administered the two different forms at initial testing.

Another difference between this sample and other longitudinal study samples, such as the Fels and Berkeley Growth groups, is that the initial testing was, in almost all cases, the child's first contact with our examiner and with the experience of being tested. While this fact makes data from our study less comparable to those from the classic longitudinal studies, it also means that our data are more representative of conditions common to most clinical and research situations in which standard tests are administered to young children.

Virtually all 2- and 3-year-olds, no matter how intellectually precocious they might be, share certain social, emotional and physical limitations. These limitations make any standard test situation a challenge for both the child and the examiner. Initial test sessions may be particularly difficult. Rust (1931, in Scott & Ball, 1965) found that young children showed a "resistance" during their first test experience that often depressed their scores. At a later session, about half the subjects in Rust's study showed gains of 15 to 35 points in Kuhlman-Binet IQ.

In order to earn a very high score on a test such as the Stanford-Binet, a 2- or 3-year-old must meet not only the usual demands of the testing situation, but also the additional demands imposed by test items designed and standardized almost exclusively for older children. Many of these items call for willingness to offer extended verbal responses to a stranger, ability to maintain prolonged attention, demonstration of fine motor coordination, or other qualities which do not reliably characterize even the brightest of very young children.

All of the parents in our sample perceived their children to be unusually bright, and many provided convincing evidence to back up their judgments. Perhaps, for a parent-nominated sample such as this, any IQ not in the superior range should be considered an anomalous finding. Since higher scores are more consistent with parents' perceptions, they might be expected to be more valid. This argument recalls the standard clinical admonition to look skeptically at any test score that is discrepant from other information about a child's abilities. We suggest that whenever a very young child has been referred for testing because of suspected intellectual precocity, a high score should usually be regarded as more compelling than a low one.

Concurrent and Longitudinal Prediction of Stanford-Binet IQ from Parent Information

Clearly, we think that parents' perceptions of their children's abilities provide useful information. This is hardly a revolutionary idea. Studies of low SES and heterogeneous samples have repeatedly affirmed the value of using information about parents themselves, or information from parents describing their children, to predict children's intellectual performance (e.g., Alpern & Boll, 1972; Bradley & Caldwell, 1976; Vernon, 1976). A standard test provides only a very small, and often less than optimal, sample of a child's behavior. Information about, or from, parents might be expected to reflect enduring characteristics of a child's heredity, environment, and/or behavior to a much greater degree than a single test score. We have evaluated this possibility within our sample by measuring the extent to which information about parents

(their education levels) and information from parents (their written descriptions of their child's intellectual accomplishments)[3] contributed to the concurrent and longitudinal prediction of Stanford-Binet IQ. Our sample provides an opportunity for a unique and stringent test of the predictive value of such information. As note earlier, the mean education level of parents in this sample is very high. Furthermore, all families within our sample have, by participating in this research project, demonstrated a strong interest in their child's intellectual development. One might expect that the usual relationships between parent variables and child's test performance would disappear within such an elite group.

Table 4

Table 4 summarizes predictive relationships between three predictor variables--mother's education, parent questionnaire score, IQ at 2 or 3 years--and the child's IQ at 4 or 5 years. Since father's education level did not contribute significantly to the prediction, it has not been included in the correlation matrix. The total sample of 36 children consisted of 19 boys and 17 girls. The results of multiple regression analysis with sex as a moderator variable (Cohen & Cohen, 1975) indicated that there were no sex differences in the contributions of any of the predictor variables. Parent questionnaire score, awarded at the time the child was 2 or 3 years old, predicted IQ at 4 or 5 years as well ($r=.53$) as did IQ at 2 or 3 years ($r=.51$). Taken as a whole, the three predictor variables accounted for 53 percent of the variance in IQ at 4 or 5 years (Multiple $R=.73$, $F=11.89$ (3,32), $p<.001$). Addition of the parent questionnaire variable significantly improved the prediction made on the basis of first IQ alone (R^2change$=.18$), as did the subsequent addition of mother's education level (R^2change$=.09$).

One additional point, clearly evident in Table 4, is critical to the interpretation of these longitudinal prediction data. Note the absence of any relationship ($r=.05$) between questionnaire scores and mother's education level. Since the scores were based, in part, on parents' written anecdotal descriptions of their child's

[3] Detailed descriptions of the questionnaire and scoring procedures can be found in papers by Jackson and Robinson (1977) and Krinsky, Jackson and Robinson (1977).

activities and interests, we had some concern that the instrument might be measuring qualities of the parent rather than qualities of the child. While that possibility cannot be completely ruled out, it does not seem to be consistent with these data.

The results of the regression analysis reported here were generally consistent with the results of preliminary analyses involving other samples of children whose parents completed somewhat different questionnaires, including an adapted questionnaire version of the Alpern and Boll Developmental Profile (Alpern & Boll, 1972) and later, extensively revised editions of the questionnaire that generated the scores used in the analysis presented above. Of particular interest is the finding, in analysis of the concurrent prediction data for both the 1977 and 1978 cohorts of the longitudinal study sample, that prediction from questionnaire score to child's IQ tended to be better for older (4 and 5 year old) than for younger (2 and 3 year old) children.

Considering both the data on the stability (or lack thereof) of Stanford-Binet IQ during the preschool years among the children in our sample, and the power of parent questionnaire information to improve the long-term prediction of IQ, it seems reasonable to conclude that the intellectual development of precocious children actually is more stable than one might judge on the basis of prediction from a single early test session.

It is possible that parent reports provide a unique insight into the intellectual accomplishments of very young, intellectually advanced children. Certainly, parents provide detailed anecdotal information which enriches our picture of what these children are like (Jackson & Robinson, 1977). However, when the question is the relatively simple one of predicting later test performance, the value of parent information may be essentially that it provides a second estimate of a child's abilities, uncontaminated by possible effects of shyness or overexcitement in a strange situation. Since the collection of parent questionnaire information is much more economical than the administration of repeated individual tests, such questionnaires have great potential for use in both research and applied contexts.

Patterns of Ability in Intellectually Precocious Young Children

While our longitudinal analyses to date have been restricted to the prediction of Stanford-Binet IQ, we do not feel that a single score gives the best possible psychometric picture of a young child's intellectual abilities. Since 1976, we have been administering to all participants in our study a comprehensive battery designed to evaluate spatial-perceptual reasoning ability, short-term auditory memory, arithmetic skill, and reading ability, as well as the verbal and abstract reasoning abilities so heavily represented on the short-form Stanford-Binet.

Table 5

Table 5 lists the components of this eclectic battery. The measures were chosen because they have been reported to tap separable aspects of intelligence, and because they can be administered to young children. The set of test items listed in Table 5 is usually administered in a single session approximately one hour in length.

Children aged 3 years, 10 months through 4 years, 11 months at the time of testing constituted the most appropriate group for evaluating interrelationships among the components of this test battery. The full set of WPPSI subtests have not generally been administered to children below the age of 3 years, 10 months, and limiting the analysis to children below 5 years of age defined a group which was unquestionably of preschool age. The upper age limit was also chosen because we have found that performance on the WPPSI subtests is increasingly subject to ceiling effects as children approach the upper age limit for standardization of that instrument. The informal reading test has not been scored in a manner that would permit its inclusion in correlational analyses.

The next two tables summarize the interrelationships among components of the test battery separately for boys and girls. Separate t-tests for each measure indicated that boys performed significantly better on the Mazes subtest ($t=3.43$ with 84 df, $p<.01$)

but that there were no significant sex differences in level of performance on any of the other measures. In addition, inspection of the correlation matrices indicated that patterns of inter-relationships among measures might be somewhat different for boys and for girls.

Table 6

As you can see in Table 6, the correlation matrix for boys, Block Design and Mazes scores were the measures most strongly correlated with short-form Stanford-Binet IQ. The Mazes and Block Design subtests were also strongly correlated with one another. Performance on the Forward Digits task was largely independent of performance on Backward Digits. The only substantial relationship between either of the digit span tests and any other measure was the relationship between Forward Digits and WPPSI Arithmetic.

Table 7

Turning to the correlation matrix for girls' test performance, we find less relationship between short-form Stanford-Binet IQ and the tests of spatial reasoning ability. Binet IQ was, however, strongly related to performance on the WPPSI mathematics subtest. For girls, as well as for boys, performance on WPPSI Arithmetic was strongly related to Forward Digits performance. Performance on Mazes was somewhat less strongly related to performance on Block Design than was the case for boys.

Without access to confirmatory factor analysis procedures, we have not been able to determine whether overall patterns of performance for boys and girls were indeed significantly different from one another. It is certainly possible, however, that patterns of specific intellectual abilities associated with high short-term Binet IQ in girls may be different from those associated with high IQ in boys. If so, principal component analysis of 4-year-olds' performance on individual items of the Stanford-Binet should be consistent with the discrepancies noted here. One of our project staff members is planning such an analysis. Another intriguing possibility suggested by these data is that particular patterns of test performance at age 4 might have different long-term predictive significance for boys and for girls.

Summary

As we work with successive cohorts of our longitudinal study sample, we expect that some of the patterns which appear convincing on the basis of data now available will change or disappear, perhaps to be replaced by other patterns not apparent in the data now available. Nonetheless, several preliminary conclusions seem reasonable from the existing data:

1. The standard test performance (short-form Stanford-Binet IQ) of intellectually advanced young children is not highly stable over time.
2. Information collected from parents when children are 2 or 3 years old can contribute effectively to the prediction of children's test performance at 4 and 5 years. The long-term predictive validity of parent information is equal to that of a single IQ obtained at the same time. Scores based on parents' questionnaire responses apparently tap a stability in young children's intellectual development above and beyond that which is manifest in standard test performance at a very early age.
3. Correlational analysis of 4-year-olds' performance on a set of tests of general and specific intellectual abilities indicates that the specific ability tests contribute information which is, in general, not redundant with the information provided by the measure of general ability. Patterns of interrelationships in test performance may differ for the two sexes, as may level of performance on the WPPSI Mazes subtest.

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TABLE 1

Background Characteristics of Children in the Longitudinal Study Sample: June 1978

Cohort	N Girls	N Boys	% Ethnic Minority	Median Mother's Education Level	Median Father's Education Level	% Firstborn
1974-75	35	39	(3)	BA	BA	(76.4)
1975-76	27	37	(31.6)	BA	MA	(60.3)
1976-77	29	23	15.4	BA	BA+	69.2
1977-78	83	74	28.9	BA	BA+	73.2

TABLE 2

IQ Distribution of 1978 Preschool Applicants

(n=153)

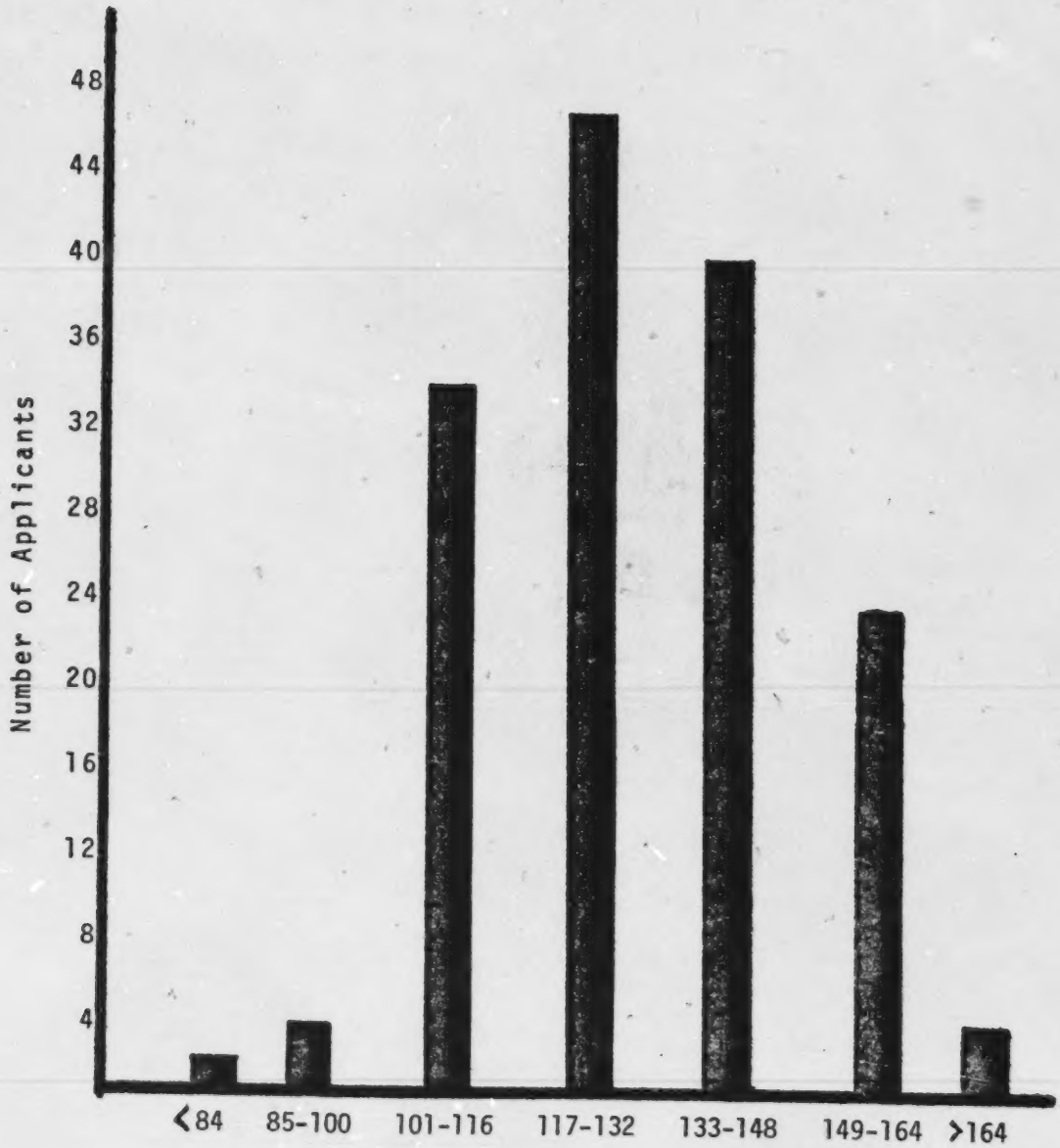
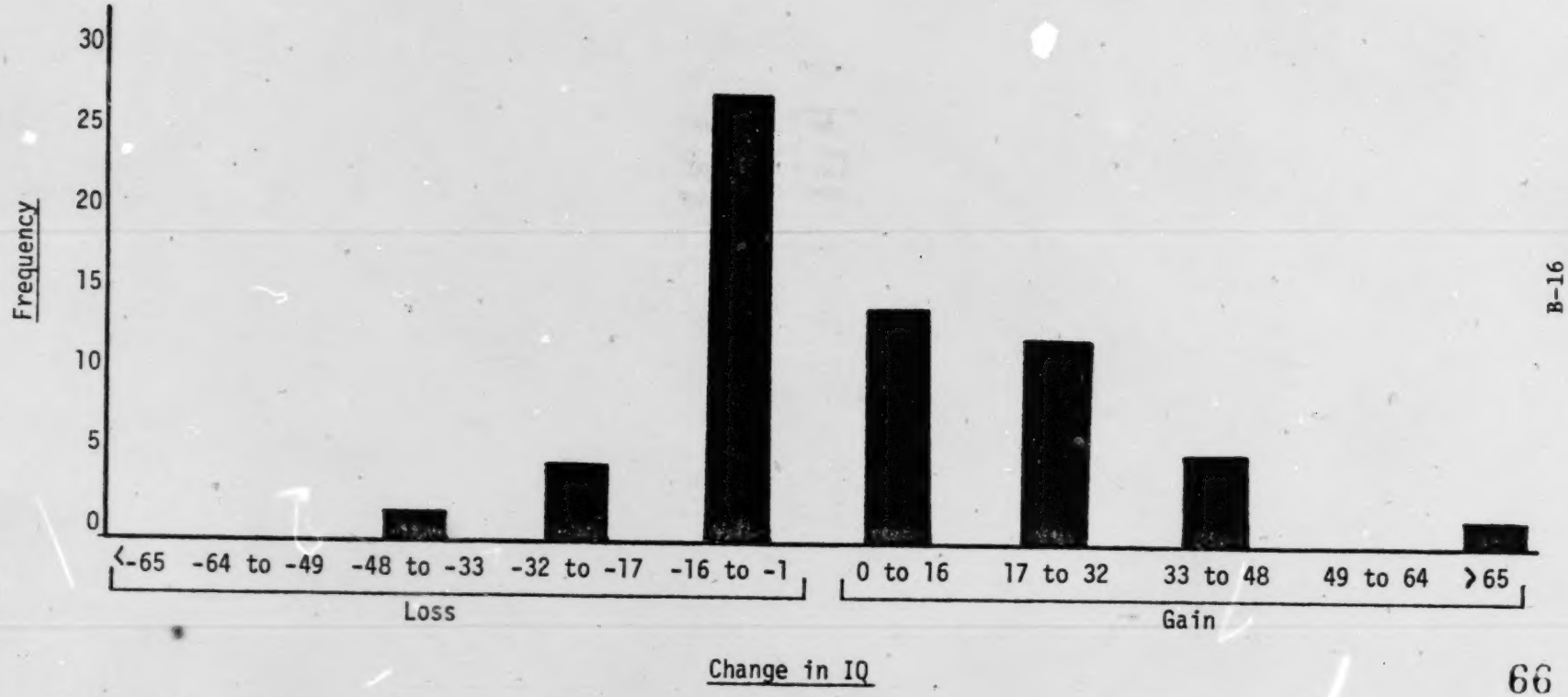


TABLE 3

Distribution of Change in Stanford-Binet IQ

From Age 2-3 Years to Age 4-5 Years



B-16

65 Note: n=65

TABLE 4

Correlation Matrix: Concurrent and Longitudinal Prediction of Stanford-Binet IQ: 1975-1977

Binet IQ at 4 to 5 Years	1.00	.51	.53	.41
Binet IQ at 2 to 3 Years	.51	1.00	.22	.26
Parent Questionnaire Score at 2 to 3 Years	.53	.22	1.00	.05
Mother's Education	.41	.26	.05	1.00
	Binet IQ at 4 to 5 Years	Binet IQ at 2 to 3 Years	Parent Questionnaire	Mother's Education

NOTE: n=36

TABLE 5

Test Battery Components

Measure	Purpose
Short-form (starred items only) Stanford-Binet Intelligence Scale	Estimate of general and/or verbal reasoning ability
WPPSI/WISC-R Mazes Subtest WPPSI/WISC-R Block Design Subtest Seguin Form Board	Estimate of spatial-perceptual reasoning ability
McCarthy Scales of Children's Abilities Numerical Memory Subtest, Forward and Backward Series	Estimate of short-term memory
WPPSI/WISC-R Arithmetic Subtest	Estimate of mathematics skill
Informal Reading Assessment	Estimate of pre-reading and/or reading skill

TABLE 6

Correlation Matrix: Test Performance of Boys

Aged 3 Years, 10 Months through 4 Years, 11 Months

	Binet IQ	Forward Digits	Backward Digits	WPPSI Mazes	WPPSI Block Design	WPPSI Arithmetic
Binet IQ (M=131.1, n=54)	1.00	.16	.32	.41	.54	.28
Forward Digits (M=.79, n=46)	.16	1.00	.10	-.07	.04	.49
Backward Digits (M=1.51, n=47)	.32	.10	1.00	.27	.30	.24
WPPSI Mazes (M=14.1, n=44)	.41	-.07	.27	1.00	.60	.18
WPPSI Block Design (M=14.6, n=49)	.54	.04	.30	.60	1.00	.46
WPPSI Arithmetic (M=15.9, n=26)	.28	.49	.24	.18	.46	1.00

TABLE 7

Correlation Matrix: Test Performance of Girls

Aged 3 Years, 10 Months through 4 Years, 11 Months

	Binet IQ	Forward Digits	Backward Digits	WPPSI Mazes	WPPSI Block Design	WPPSI Arithmetic
Binet IQ (M=137.6, n=43)	1.00	.31	.27	.05	.32	.74
Forward Digits (M=.63, n=41)	.31	1.00	.35	.00	.32	.59
Backward Digits (M=1.07, n=41)	.27	.35	1.00	.01	.37	.32
WPPSI Mazes (M=12.1, n=42)	.05	.00	.01	1.00	.44	-.12
WPPSI Block Design (M=14.8, n=41)	.32	.32	.37	.44	1.00	.00
WPPSI Arithmetic (M=15.6, n=20)	.74	.59	.32	-.12	.00	1.00

APPENDIX C

Social Development in Intellectually Advanced Children[1]

Paper presented in the symposium, Intellectually Advanced Children: Preliminary Findings of a Longitudinal Study, Halbert B. Robinson (Chair). Annual Convention of the American Psychological Association, Toronto, August 30, 1978

Wendy Conklin Roedell

An integral part of our study of intellectually advanced children is the development of meaningful ways to describe their social and emotional adjustment and to assess how development in this area is related to patterns of intellectual skills. Data from several previous studies (e.g., Terman, 1925) support the currently popular notion that intellectually advanced children are generally more advanced socially than average children. Other evidence, however, (e.g., Hollingworth, 1942) suggests that in some cases intellectual advancement can be associated with social and emotional difficulties. Data from many studies indicate that within any group of gifted children there is a wide range of personality types and levels of social maturity (Gallagher, 1975). Few studies, however, have undertaken to describe particular patterns of social skills development in gifted children, and still fewer studies have been done with children of preschool age.

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[1]The research presented in this paper has been supported by grants from the Spencer Foundation and from the U. S. Office of Education, Office of Gifted and Talented (300-76-0441). A major contribution to the study has been made by Linda Kaien, who coordinated the PIPS testing and, together with Donna Dykstra, developed the content categories for coding PIPS solutions. The study is part of the longitudinal investigation of the development of intellectually advanced children designed by Halbert B. Robinson, principal investigator, together with Nancy E. Jackson and the author, associate investigators. The author is grateful to Charles Stillman, who executed the data analyses presented here.

The preschool program associated with our longitudinal study provides a unique setting for the study of social behavior. The program serves between thirty and thirty-five children daily during the academic year. They are selected for the program by the parent questionnaire and the assessment battery described in the preceding paper. Children can qualify on the basis of test performance or parent questionnaire information indicating outstanding ability in any of the areas assessed. Some children in the program show advanced skills in many intellectual domains, while others demonstrate advanced ability in only one or two areas.

Our informal observations of these children continually remind us of the extreme variety in their social abilities. We have seen bright 3- and 4-year-olds who are quite socially competent, and others, equally bright, who tend to hit and kick when frustrated, to have trouble communicating needs and feelings to other children, to lack the skill to carry on cooperative play, and so on. This wide range of competence was evident in teachers' estimates of the general social maturity level of the children enrolled in the 1976-77 preschool program. Teachers' ratings of the children using the California Preschool Social Competency Scale (Levine, Elzey & Lewis, 1969) placed them in percentiles ranging from the fifteenth to the ninety-eighth, as compared to a national sample of preschool-aged children. The ratings were, however, positively correlated with Stanford-Binet IQ (rho=.61). This paper describes our exploration of several more specific aspects of social development undertaken during the 1977-78 academic year.

Method

Subjects

The 1977-78 program combined a preschool with a kindergarten. The thirty-two children involved in various aspects of the study ranged in age from 36 months to 71 months at the beginning of the year, with a mean age of 53 months. The IQs of the twenty-seven children with scores available ranged from 92 to 174, with a mean of 138, as measured on the Stanford-Binet given in the spring of 1978. Since some information was not available for all subjects, the sample size changes slightly in some of the following analyses.

Procedure

All social behavior data were collected twice, once during fall quarter 1977, at the beginning of the school session, and once during spring quarter 1978, just before it ended. Relationships between social behavior and intelligence were explored using social behavior data collected in the fall of 1977 compared with IQ tests given during the spring of 1977, and social behavior data collected in the spring of 1978 compared with IQ tests given in the spring of 1978. Mental ages were adjusted to compensate for the disparity in chronological age between data collection times.

Measures

Three different types of measures were used in the assessment of children's social skills.

PIPS Test: First, their ability to solve theoretical social problems was assessed with the Preschool Interpersonal Problem-Solving Test (PIPS) developed by Spivack and Shure (1974). This test measures children's ability to conceptualize alternative solutions to social conflicts, and has been found to relate to general social adjustment in disadvantaged preschool children.

The test consists of two parts. In the first section, a child is shown pictures of two boys or girls involved in conflicts over toys. The child is asked to think of different things one of the boys (or girls) might do or say to have a chance to play with the toy being monopolized by the other. In the second section, the child is shown pictures of a boy or girl and his/her mother, and told a story in which the boy or girl has done something which might make the mother angry. The child is asked to think of different things the boy or girl might do or say so that the mother will not be mad. In both sections of the test, children are presented with a series of problems and are asked to think of solutions which are different from ones they have given previously. The child's total score represents the total number of unique solutions given by the child.

In addition to summing each child's total number of unique responses, all solutions were categorized according to content categories developed for the purposes of this study. Both unique solutions, and

repetitions of similar solutions, were categorized according to whether they involved physical aggression, assertive behavior, cooperation, non-interactive ploys, or generally friendly or not friendly behavior. Percent agreement between two coders scoring recorded transcripts of each test session ranged from 98 to 100 percent on these categories. Agreement was 100 percent for total score. The few disagreements between coders were resolved by discussion.

Teachers' Ratings: A second measure involved teachers' ratings of children's behavior using the Hahnemann Preschool Behavior Rating Scale, also developed by Spivack and Shure (1974). Each child was rated by each of the two head teachers in the program. The mean of the two teachers' ratings was used as the child's rating score to obtain a stable measure of teachers' impressions of the child. Ratings were made on a nine-point scale, and covered a number of characteristics. The first seven items concerned the degree to which a child tends to be upset, dominant, or aggressive. Percent agreement within one rating point between teachers on these items averaged 60 percent.

Observations: The third set of information was based on modified frequency observations of ongoing social behavior during the daily free activity time in the preschool classroom. Children were observed for a series of from four to six five-minute observation periods by four trained observers. Each observer observed all the children in a randomized sequence. Behaviors were coded every ten seconds during the five-minute observation period. For each ten-second interval, two decisions were made by the observer. The first decision determined which of five mutually exclusive and exhaustive categories of social interaction style characterized the interval. The ongoing social interaction categories represented a modified version of the classic code developed by Parten (1932). The categories included unoccupied behavior, independent activity, interaction with a teacher, parallel activities in which the child's activities were similar to those of nearby children, and interactive activities involving direct interaction between children. The second decision determined whether any of five mutually exclusive social behaviors occurred during the interval, or whether the interval should

be described as neutral. Specific social behaviors included physical aggression, destruction of property, crying, assertive/negotiating behavior, and helpful or sharing behavior. If none of these behaviors occurred, the neutral category was scored. Mean percentages of observations coded in each category were calculated across observation periods and served as the observed behavior scores.

Since the data were collected during the fall of 1977, and again during the spring of 1978, reliability checks were made using a videotape of the children in a free play situation. Three observers collected data in the fall. Percent agreement between these observers, coding the videotape in the fall, ranged from 79 percent to 83 percent, with a mean of 81 percent for the social interaction categories, and ranged from 93 percent to 95 percent with a mean of 94 percent for the social behavior categories. One of these observers also collected data in the spring, together with a new observer. Percent agreement between these two, coding the tape in the spring, was 78 percent for social interaction categories, and 94 percent for social behavior categories. To check for observer drift between fall and spring, percent agreement was calculated between observers who coded the videotape in the spring compared with observers who coded the tape in the fall. Agreement ranged from 66 percent to 79 percent with a mean of 73 percent for social interaction categories, and from 87 percent to 90 percent with a mean of 88 percent for social behavior categories. Observers found it difficult to score the videotaped behavior, since contextual cues to an interaction tended to be absent from the tape. Reliability checks on observations in the field tended to yield somewhat higher agreement scores.

Results

Preliminary analyses indicated a lack of sex differences in any of the measures. Subsequent analyses were performed, therefore, on both sexes combined.

PIPS Test

In general, the bright 3- through 6-year-olds in this sample generated more solutions to PIPS problems than did the 4-year-olds tested by Spivack and Shure. The mean total PIPS score for the fall

testing was 8, with a standard deviation of 4.3. There was a wide range of scores--from one relevant solution to twenty solutions. Spivack and Shure (1974) report a mean performance of five solutions for well-adjusted preschool children in their sample.

PIPS scores did not change significantly for our children during the year. For the twenty-seven children who were given the PIPS test in both fall and spring, the test-retest correlation was .68.

Teachers' Ratings

T-tests indicate that teachers' impressions of the children's behavior changed from fall to spring for some variables. In the spring, children were rated as less persistent and nagging, less easily upset by peers and adults, less prone to emotional upset, better able to overcome obstacles by themselves, more willing to talk with peers, more likely to show initiative, and better liked by peers (t-tests all significant at the .05 level or better).

Observations

A striking difference between fall and spring behavior was also evident in the observations of the children's social interactions, as shown in Figure 1. The twenty-five children for whom both fall and spring observations are available decreased their unoccupied, independent, and teacher interaction behavior, and increased their parallel and interactive activities (t-tests significant at the .05 level or better). Aggression, helping/sharing, and assertive behavior did not change significantly during the course of the year. Frequencies of crying and destruction were too low to permit meaningful analysis.

The increase in interactive play was evident among many of the children. Only ten (40 percent) of the twenty-five children were observed engaging in interactive play during more than 20 percent of the observation intervals in the fall. By spring, however, twenty-two of these children (88 percent) were observed in interactive play during more than 20 percent of observation intervals.

Relationships Among Measures

Pearson product-moment correlations were computed among measures derived from the PIPS test and measures describing children's behavior

as rated by teachers and as observed directly in the classroom. There were more significant correlations among the measures collected during the fall than among those collected during the spring. Data are summarized in Table 1. The eighteen significant correlations are taken from a matrix of 105 correlations, in which seven PIPS variables (total score plus totals in each content category) are correlated with the seven teacher ratings of emotionality and aggressiveness, the five observed social interaction variables, and the three social behaviors of aggression, assertiveness, and helping/sharing. Total figures in each PIPS content category refer to unique solutions plus repetitions generated by each child. The correlations among these variables in the spring data were much lower and were not significant, although in most cases the relationships were in the same direction.

Spivack and Shure indicate that in their sample, the PIPS test distinguished well-adjusted children from children who could be considered impulsive. Of the twenty-four children for whom fall mean teacher ratings were available in our sample, nine could be classified as impulsive using Spivack and Shure's criteria of total rating score on the seven measures of emotionality and aggressiveness equal to 38 or above. No significant differences were found between the PIPS performance of children rated as impulsive and children rated as well adjusted.

Relationships with Age and Intelligence

The twenty-two children for whom all scores were available were divided according to a median split by IQ and by age. The characteristics of the resulting groups can be seen in Table 2. Obviously, the so-called low IQ group is made up of children who are predominantly above-average in IQ, although their scores are lower than those in the high IQ group. IQs in the high group ranged from 140 to 174, and in the low group from 92 to 139. The young group ranged in age from 3 to 4-1/4 years in the fall, and the older group from 4-1/2 to almost 6 years old.

At 2 (age) X 2 (IQ level) X 2 (time of test) mixed-design analysis of variance with repeated observations was performed on each PIPS measure and on each observation measure. (Analyses were not performed

for observations of unoccupied behavior, however, due to non-homogeneous variances between subgroups.)

It was found that the high IQ children gave more solutions to PIPS peer stories, $F(1,18) = 5.4$, $p<.05$, and to PIPS mother stories, ($F(1,18) = 6.0$, $p<.05$, and, consequently, had a higher total score, $F(1,18) = 6.9$, $p<.05$, than the low IQ group. Older children gave more solutions to PIPS mother stories, $F(1,18) = 5.3$, $p<.05$, but age had no effect on total score. In addition, it was found that the high IQ group gave more unique solutions involving cooperative interaction between two children, $F(1,18) = 14.4$, $p<.001$; repeated this type of solution more frequently, $F(1,18) = 10.0$, $p<.01$; and consequently gave more total cooperative solutions, $F(1,18) = 13.2$, $p<.001$ than the low IQ children. Two of the interaction effects were also significant in the analysis of total cooperative solutions. The older children gave more total cooperative solutions in the fall, and younger children gave more in the spring, $F(1,18) = 6.0$, $p<.05$. Figure 2 shows the three-way interaction between Age, IQ, and Time of Test, $F(1,18) = 4.3$, $p<.05$. Duncan's Multiple Range tests indicate that the young, high IQ children significantly increased the number of cooperative solutions given from fall to spring, and gave more of these solutions in the spring than did any of the other group. In the fall, all groups gave more cooperative solutions than the young, low IQ group, and in the spring the old, high IQ group gave more solutions than the young, low IQ group, but was not different from the old, low IQ group.

Surprisingly, no age or IQ effects were found in the analyses of observed behaviors. The general changes from fall to spring noted earlier held for all groups equally. Significant partial correlations, however, showed that, in the fall, children more advanced in mental age tended to engage both in more interactive play and in more helping and sharing behavior. The partial correlation between these measures and mental age with chronological age controlled was .50 for interactive play and .47 for helping/sharing. The parallel correlations with chronological age, holding mental age constant, were negative and nonsignificant.

No relationships were found between teachers' ratings on seven items concerning children's emotional and aggressive behavior and either mental age or chronological age. Among the nineteen more generally descriptive teacher ratings, however, nine produced substantial relationships with mental and chronological age when either mental or chronological age was controlled using partial correlations. Table 3 shows the partial correlations of the fall teachers' ratings with mental age and chronological age. Correlations are reported when at least one of the pair was significant at the .05 level or better. The pattern was similar in the spring, but the correlations were not as high and most were no longer significant. Ten other rating items did not show a significant relationship with mental or chronological age (seeks adult attention and support; able to make himself/herself understood with words; overcomes obstacles by himself/herself; asks for special privileges or special help from teacher; willing to talk with peers; shows initiative in what he/she does; wants to be physically close to teacher; initiates classroom discussion; shows concern and/or offers help to a child in distress; liked by peers).

Discussion

One of the most striking findings in each set of these measures of social development is the wide range of performance within the group. Certainly it would be difficult, if not impossible, to compile an adequate profile of "the gifted child" from these data. IQ, however, did bear some relationship to some measures of social skill. Predictably, in most cases these relationships occurred with measures which involved cognitive aspects of socialization. The teacher impressions most highly related to mental age, for example, all reflected some dimension of intellectual behavior. "Completes activities by himself" is the only item which might be considered more purely social. In addition, the high IQ group consistently performed better on the PIPS test, a measure of the ability to understand and solve theoretical social problems. The high IQ group gave many more solutions which involved cooperative interaction between children, and the younger, high IQ children increased their cooperative solutions

from fall to spring. Whether this increase was due to increased general experience, advancing maturity, the preschool program, or some combination of these is impossible to conclude. Since they generated more cooperative solutions than either of the older groups, increasing age alone cannot account for the change. It may be that these young, bright children were most responsive to aspects of the program which encouraged cooperative problem solving. In any case, the brighter the children as measured on a test of general intelligence, the more ideas they had about ways for children to interact. This finding is consistent with studies which have related generally advanced cognitive development to advanced social cognition in several areas (Shantz, 1975).

The effect was partially substantiated in behavior by the significant correlations of mental age with interactive play and helping/sharing behavior revealed in the fall data. The measures of social behavior, however, showed no difference between IQ groups. The distinct IQ differences in cognitive social problem-solving ability were not reflected in similar differences in observed social behavior.

Furthermore, correlations of PIPS scores with teacher ratings showed some relationships contrary to the findings reported by Spivack and Shure (1974). Children who gave more problem-solving responses in our group tended to be rated higher on several measures of emotionality and aggression, and the predicted differences in PIPS performance between "impulsive" and "adjusted" children were not found. PIPS performance did show some general relationships with observed behavior in the fall, but no clearly interpretable pattern was present. It appears, however, that the content of solutions may be just as important for this group as the general number of solutions. For example, children who gave more aggressive solutions tended to interact less with peers, while children who gave more cooperative solutions tended to interact more with peers. These findings need to be replicated before much confidence can be placed in them.

The children in our sample represent, of course, a far different population than the disadvantaged preschoolers studied by Spivack and

Shure. The lack of the predicted correspondence between PIPS performance and behavior may be due to the generally high level of problem-solving ability in these children. Although there was a wide range of performance, it may be that few of the children were in fact deficient in social problem-solving ability. Among children who could generate many solutions to theoretical PIPS problems were children rated high by teachers on emotionality and aggressiveness. This finding indicates that problem-solving ability alone, or even knowledge of cooperative problem solutions, is not sufficient to guarantee appropriate behavior.

A far stronger influence on behavior than either general IQ, age, or social problem-solving ability was the time of year assessments were made. The differences in the fall and spring measures should serve as a warning to researchers intent upon studying children's social behavior. It is important to take into account such variables as amount of time spent in a program.

Both observed behavior and teachers' impressions showed dramatic changes from fall to spring. Teachers were at no time aware of children's test scores. Their ratings were based only upon their impressions of the children's behavior. Changes in teachers' ratings may only be reflecting changes in the teachers' perceptions. However, the fact that observed behavior also changed suggests that teachers may have been responding to actual changes in the children's behavior in the preschool.

Notably, the increase in interactive activity was not accompanied by an increase in interpersonal physical aggression. Other studies (e.g., Patterson, Littman & Bricker, 1967) have shown that aggression is likely to increase during the year in a preschool as children discover that such behavior can result in tangible rewards. Aggression at our preschool, however, was actively discouraged, and the children directed into non-violent methods of problem-solving. The fact that aggression did not increase in this group suggests that this aspect of the program was effective.

Many of the relationships among teacher ratings, observed behavior, PIPS variables, and mental age which were found in fall disappeared or were greatly reduced in the spring. The strong

effect of situations on children's social behavior is evident in these shifting patterns of relationships. It may be that children's behavior upon entering a new program is related to their general cognitive abilities. Children who are highly verbal, for example, may be less shy about engaging in conversations with strange children. Behavior at the end of the year, however, may be more a result of particular events that occurred during the course of the program, particular friends made by different children, different interests which developed during the year, and so on. Social measures collected on these same children under different conditions may produce still different relationships. It is difficult, therefore, to make general statements about the social development of children unrelated to the setting in which the social behavior is to be described.

Since no attempt was made to assess changes in social behavior of children enrolled in other preschool programs, the changes noted here cannot be attributed to the particular characteristics of our program. However, the preschool program did emphasize the teaching of social interaction skills through teacher guidance and general positive reinforcement procedures. In addition, structured group lessons periodically involved the children in discussions designed to sensitize them to other people's feelings and to improve their social problem-solving ability. It can be concluded, therefore, that bright children enrolled in a preschool program that emphasizes social skills can be shown to increase the amount of social interaction they engage in. The lack of relationship between age and interaction patterns suggests that increasing maturity alone may not account for these behavior changes.

The lack of consistent relationships among observed social behaviors and other variables may be a result of the general nature of the coding system. Further research is needed in which the social interactions of intellectually advanced children are examined in detail for quality of interactive behavior. Conversations among children who are mental age peers, for instance, may have characteristically different styles than those among children of similar chronological age but different mental ages. Certainly intellectually advanced preschool children enjoy socializing by the end of the

the year, they were spending an average of one third of their free play time interacting with other children. Whether this percentage would be so high if the children available for interaction were less advanced intellectually is an interesting question. Perhaps learning the skills of social interaction in a preschool program with children of similar intellectual ability will help these children in their later interactions with children of a wide range of abilities. Certainly more work is needed to establish the ways in which social adjustment can be optimized for intellectually advanced children.

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FIGURE 7

Mean Percent of Observation Periods Spent in Different Types of Social Behavior

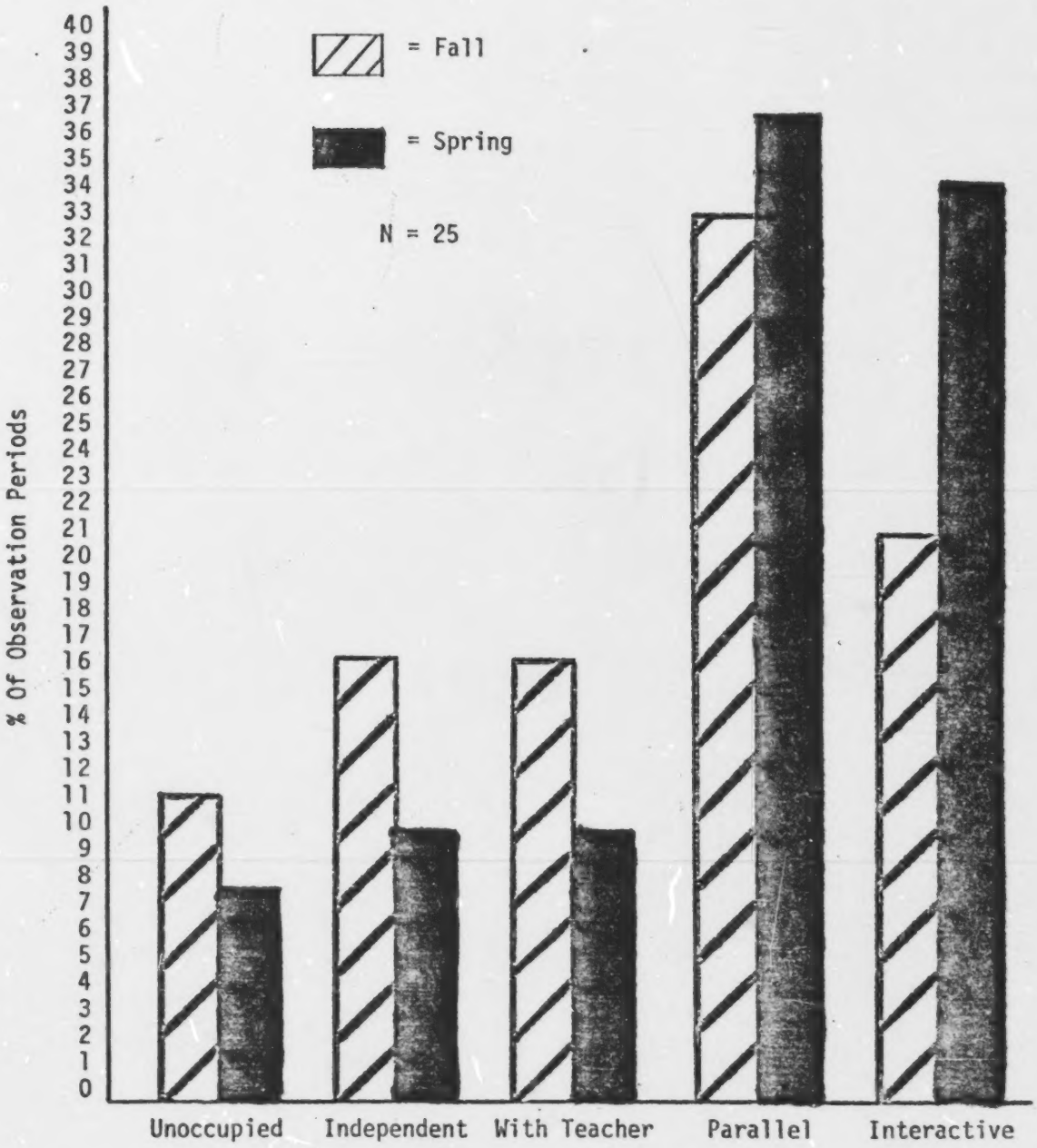

TABLE 1

Summary of Significant Correlations Among
Measures Taken in the Fall[a]

A. Children who gave more <u>total</u> PIPS solutions were:

1. Rated[b] as: More physically aggressive (r=.54)
   More dominant and bossy (r=.45)
   More prone to emotional upset (r=.54)

2. Observed to: Interact more with teacher (r=.42)

B. Children who gave more <u>aggressive</u> PIPS solutions were:

1. Rated as: More easily upset by peers (r=.47)
   More prone to emotional upset (r=.42)

2. Observed to: Interact more with teacher (r=.48)
   Interact less with peers (r=-.38)
   Engage in less aggression (r=-.41)

C. Children who gave more <u>cooperative</u> PIPS solutions were:

1. Rated as: More dominant and bossy (r=.46)
   More aggressive (r=.59)

2. Observed to: Interact more with peers (r=.40)
   Engage in more assertive behavior (r=.38)

D. Children who gave more <u>unfriendly</u> PIPS solutions were:

1. Rated as: More aggressive (r=.43)
   More prone to emotional upset (r=.55)

2. Observed to: Interact more with teacher (r=.51)

E. Children who gave more <u>assertive</u> PIPS solutions were:

1. Observed to: Engage in more parallel play (r=.43)
   Interact less with peers (r=-.50)

[a]All correlations significant at the .05 level or better.

[b]n=24 for correlations with teacher ratings.

[c]n=28 for correlations with observations.

TABLE 2

Characteristics of Groups Divided by Age and IQ

AGE	IQ: LOW	IQ: HIGH
YOUNG	n = 6 Mean Age In Months: Fall = 42.2; Spring = 47.5 Mean IQ = 129.7	n = 5 Mean Age In Months: Fall = 46.2; Spring = 52.0 Mean IQ = 150.2
OLD	n = 5 Mean Age In Months: Fall = 64.4; Spring = 68.4 Mean IQ = 122.8	n = 6 Mean Age In Months: Fall = 57.3; Spring = 64.2 Mean IQ = 149.0

FIGURE 2

Total Cooperative PIPS Solutions by Age and IQ of Children and Time of Test

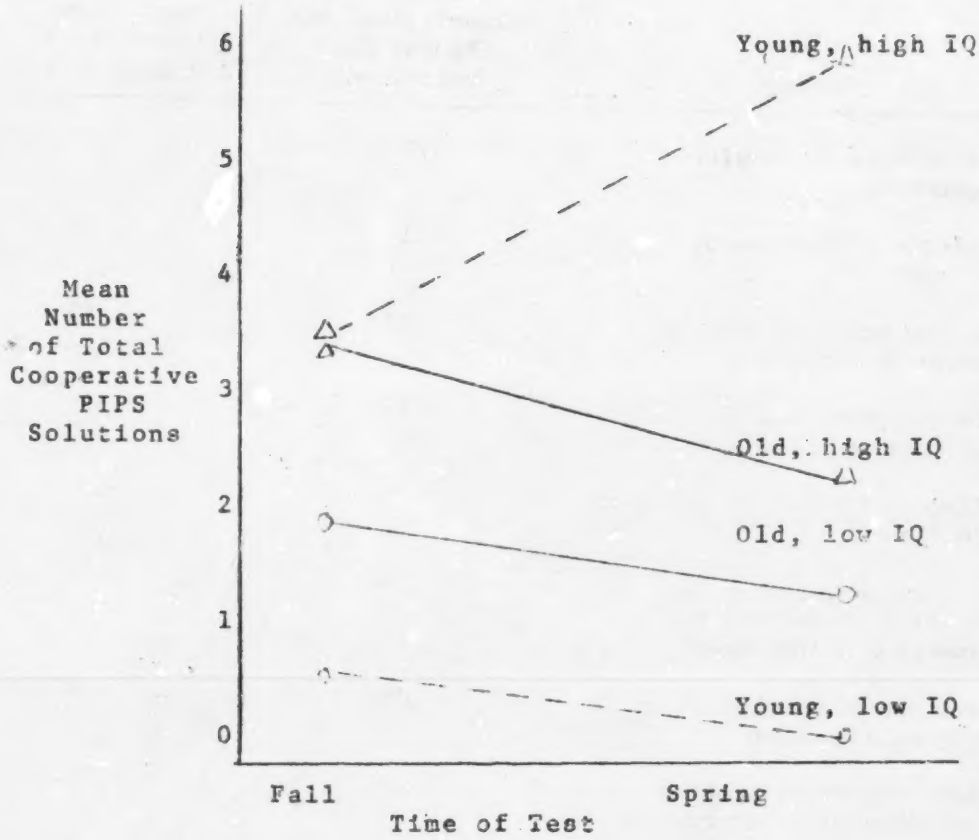

TABLE 3

Partial Correlations of Teacher Ratings with Mental Age and Chronological Age[a]

Rating	Chronological Age (Mental Age Controlled)	Mental Age (Chronological Age Controlled)
Able to talk in complete sentences	-.68	.72
Completes activities by himself	-.29	.41
Gets the point of what he hears in class	-.87	.89
Able to apply what he has learned to a new situation	-.79	.84
Oblivious to what is going on in class	.70	-.69
Gives an answer that has nothing to do with the question being asked	.84	-.84
Makes you doubt whether he is paying attention	.96	-.96
Makes irrelevant remarks during a class discussion	.69	-.65
Acts defiant	.36	-.19

[a] n=22

APPENDIX D

The Early Entrance/Optimal Match Program[1]

Paper presented in the symposium, Intellectually Advanced Children: Preliminary Findings of a Longitudinal Study, Halbert B. Robinson (Chair). Annual Convention of the American Psychological Association, Toronto, August 30, 1978.

Halbert B. Robinson[2]

In the course of our experiences with gifted young children, as described in the two previous papers, we also became aware of the needs of older, highly gifted learners who are ready for university-level work. In identifying children for our longitudinal study of academically advanced children, we became acquainted with a number of children who were of preschool age but whose academic skills were at advanced levels of elementary school. We cooperated with officials from the Seattle Public School District to establish a kindergarten-through-twelfth-grade program for such children, a program which opens its doors in September, 1978. During this process, we grew concerned about those children who would complete the K-12 sequence in less than 13 years, a reasonable concern indeed. In considering ways to meet the needs of such children, the Early Entrance/Optimal Match Program (EE/OMP) was established.

The creation of the EE/OMP was also a response to families who contacted us for a diagnostic appraisal of their children's capabilities and advice about educational placement. Very often

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[1]The Early Entrance/Optimal Match Program has been generously supported by a grant from the Ford Foundation. This program is a part of a complex of projects concerned with the identification and nurturance of extraordinarily gifted young people. The projects are supported by the Spencer Foundation, the Medina Foundation and the U.S. Office of Education.

[2]Much of the preliminary work on the EE/OMP was done by Elisabeth J. Bell who deserves much of the credit for the development of this program. Judith Opacki did many of the data analyses which provide much of the substance of this paper.

these parents were frantic about the plight of one or more of their children. One such case was a 12-year-old girl named Sarah. She had excelled as a child in an experimental preschool and during the first few grades of elementary school. During grades three and four, she had been given increasing amounts of "independent study", which in her school (and probably most others) meant simply that there was no suitable program for her. Her sixth grade teacher was apologetic but firm in stating that she had nothing to offer Sarah. Upon her advice, Sarah was transferred to a private school for gifted children, but after a year, she began to tax even the resources of this very fine school. We saw the family at this point, when Sarah was 12 years and 5 months old. On the Washington Pre-College Test, she scored at the 90th percentile in the quantitative areas and at the 75th percentile in the verbal areas when compared with high school juniors who later entered four-year colleges in the state of Washington. It seemed clear that she was academically prepared for college and was bored and unhappy in the school she was in.

Sarah was one of many such children; there was no program for any of them. When we discussed establishing an early entrance program, we were accused repeatedly of callousness about the social and emotional development of these young people. Our review of previous research, and our information about Julian Stanley's pioneering program at Johns Hopkins University, indicated on the contrary that advancing an individual academically according to his or her own rate of progress might well have positive consequences and threatened few, if any, negative ones (e.g., Daurio, 1977; Robinson, 1977; Stanley, 1978).

For these reasons, we launched the EE/OMP in the spring of 1977, with Sarah and a 14-year-old boy, each of whom took 10 units of university work while they were simultaneously enrolled full time in seventh and eighth grade school programs, respectively. With courses in calculus and astronomy, their joint grade point average for that quarter was 3.9 out of a possible 4.0.

Since then, the program has expanded rapidly. We have seen almost 100 applicants, of whom about one-third have qualified;

half of those who qualified have become involved in the program already or will do so in Autumn Quarter, 1978, either as full-time or as part-time students at the University. As you will see, almost all of our students are doing well by any standard. They get good grades and are very happy, socially adept and emotionally stable young people who have had no difficulty adjusting to a large state university.

Qualifications for the EE/OMP

The early entrance program is designed for students with exceptional academic skills who have not yet entered the ninth grade. In order to take the test battery, a student must have compiled an outstanding school achievement record and/or have consistently scored in the very top ranges on standardized intelligence and achievement tests.

Among such students, qualification for admission to the program is based on the results of the Washington Pre-College Test (WPCT). This test, which is normally given to college-bound high school juniors, has several advantages as an assessment and guidance tool for use with academically advanced students. It yields scores defining a range of nine specific cognitive abilities, including verbal, quantitative, spatial and mechanical skills. These scores correlate highly with scores from the Scholastic Aptitude Test (in fact, estimated SAT verbal and quantitative scores are derived from the test). In addition, a Vocational Interest Inventory (VII) is given as a part of the battery. The VII, in turn, provides a profile which can be of help to young students who are choosing courses from the bewildering array offered at the University. To be accepted in the early entrance program, a student must earn several scores on the WPCT which fall above the 80th percentile of high school students who took the test and then entered four-year colleges in the State of Washington. That is, the student must earn high scores in the verbal area, the quantitative area, or both.

In addition to the test scores and a promising record of intellectual and/or academic achievement, prospective students

must convince our staff that they are strongly motivated to enter the University and that their social maturity appears to be such that they are able to cope with the University environment. (We have recently added still another requirement: the student must be able to write rapidly and legibly enough to take notes in lectures. We have one 9-year-old child who is academically qualified but who is still printing, laboriously, a letter at a time.)

Applicants to the EE/OMP

Table 1 summarizes some characteristics of students who have applied for the early entrance program. We have seen a total of 92 applicants not yet in ninth grade, of whom 53 percent are male and 87 percent are white. Almost three-quarters were referred by school personnel (teacher, counselor, or principal) while the remainder were referred by their parents or came in on their own.

TABLE 1

Applications to the EE/OMP
February 1977 to July 1, 1978

Total 92			
Male	49	White	80
Female	43	Asian	7
Parent or self referral	26	Black	3
School referral	66	Other	2

Students Who Qualified for EE/OMP

Table 2 presents information about the applicants who qualified for the program as well as about those who have entered it on a part-time basis. Qualified applicants have ranged in age from 9 years, 4 months to 14 years, 5 months; actual entry ages have ranged from 11 years, 8 months to 14 years, 5 months. We now

have 14 students, about half of whom take courses on a part-time basis in anticipation of possible full-time enrollment, and about half of whom are enrolled full time.

TABLE 2

Students Qualified for and Entering the EE/OMP

Age Range[1]	Qualified	Entered		
		Part-time	Full-time	Total
9-0 to 9-11	1	0	0	0
10-0 to 10-11	0	0	0	0
11-0 to 11-11	2	1	0	1
12-0 to 12-11	8	3	2	5
13-0 to 13-11	10	3	1	4
14-0 to 14-11	7	1	3	4
	28	8	6	14

[1] Age range is at time of testing.

Table 3 presents the range of scores of qualified applicants on the verbal and quantitative components of the Washington Pre-College Test; the numbers in parentheses describe the scores of students who have actually entered the program. Ranges on the test are defined by percentile scores. Of actual students, none has scored above the 80th percentile in both areas, although all have, of course, done so on either the verbal or the quantitative components.

TABLE 3

Students' Scores on Verbal and Quantitative Components of WPCT[1]

		Verbal		
	Percentile	80	50-80	50
Quantitative	80	3 (0)	9 (5)	2 (1)
	50-80	11 (6)		
	50	3 (2)		

[1] Students qualifying for EE/OMP are listed first
Students entering are in parentheses

Table 4 presents a breakdown of the qualified applicants and actual entrants according to the area (verbal, quantitative, or both) in which they qualified. More females qualified in the verbal area and more males in the quantitative area. At this point, only Caucasian and Asian students have qualified, and only white students have actually entered.

TABLE 4

Students Qualifying and Entering the EE/OMP by Area in Which They Qualified[1]

	Verbal	Quantitative	Both
Total	14 (8)	11 (6)	3 (0)
Male	5 (2)	8 (3)	2 (0)
Female	9 (6)	3 (3)	1 (0)
White	13 (8)	9 (6)	3 (0)
Asian	1 (0)	2 (0)	0 (0)
Other	0 (0)	0 (0)	0 (0)

[1]Students qualifying for EE/OMP are listed first
Students entering are in parentheses.

Table 5 lists the sources of referral according to outcome of the admission decision. Parental and self-referrals have yielded a much high percentage of subsequently qualified students than have school referrals.

TABLE 5

Source of Referral for Students Applying for EE/OMP

Referral Source	Qualified	Not Qualified
Parent or self	13	13
School	15	51

Indeed, as shown in Table 5, less than one referral in four from the schools has qualified, while half the parental referrals

have done so. It seems possible that the batting average for the school referrals can be improved by better communications.

Performance of Students in EE/OMP

The overall grade point average for all students at this time is 3.6 of a possible 4.0. Grades have not differed substantially for males (overall G.P.A.=3.65) and females (overall G.P.A.=3.50). Table 6 presents grades in verbal courses (e.g., history and English) and quantitative courses (e.g., mathematics and physics) according to the area in which the student qualified. Although the number of courses in some cells is small, thus far the only students who have had trouble are two part-time "verbal" students who have enrolled in a total of three quantitative courses. From these students, we have learned to pay closer attention to the qualifying scores in selecting the initial courses students take at the University.

TABLE 6

Grades in Verbal and Quantitative Courses by Students Qualifying in Verbal and Quantitative Components of WPCT[1]

Area in Which Qualified	Courses	
	Verbal	Quantitative
Verbal	3.6 (8)	2.5 (3)
Quantitative	3.7 (3)	3.75 (12)

[1]Figures in parentheses are the number of courses involved in the analysis.

Aspects of the Program

Staff members of the early entrance program keep a fairly tight rein on the students. All early entrance students to the University of Washington (including a few entering from high schools who are not part of the EE/OMP) are screened and admitted through our offices. All courses taken by our students must be approved by our staff, who confer with advisers and faculty through-

out the University. In contrast with the prevailing situation in the University at large, we do consider it our responsibility to act in loco parentis. We insist that students inform us generally of their whereabouts on the campus, and we encourage them between classes to use the lounge and study area provided for them in our laboratory.

Full-time EE/OMP students are required to make a 3.5 grade point average during their first full-time quarter and to maintain a 3.3 grade point average thereafter. These arbitrary figures were chosen because they represent the mean for regular students who score at or above the 80th percentile on the Washington Pre-College Test. Our strong feeling is that the University experience should be challenging, enjoyable, and successful, and that students should under those conditions try to do their best. Given this assumption, the requirements do not appear too demanding, although of course they may be modified at a later date. At this point, none of our students have had any serious difficulties with them. Had our exceptional students waited until a later date to enter college, it seems probable that their achievement would have been very respectable. Unless they are able to do well at the University as very early entrants, we feel that they are better advised to delay a year or two, perhaps maintaining a part-time involvement until they are better prepared.

Much of our effort is devoted to trying to develop a core peer group and a support system to encourage the healthy adaptation and growth of our young charges. Each full-time student is required to meet with the entire group twice per week in a program which combines orientation to the University community and its resources, an opportunity to share experiences, and a general "rap" session. A minimum amount of ungraded course credit is given for regular attendance at the group meetings. Thus far, our impression is that the group has served its purpose well. The students are developing friendships within the group as well as with other regular students, participation in the group meetings has been enthusiastic, and we have observed what seems to us to be a very positive kind of adaption in each of the youngsters thus far involved. In no case

has the University experience seemed to either the student or the staff to have been anything but a positive growth experience.

Finally, I would like to emphasize a few points. First, our program is relatively new. We feel we have just passed through the pilot phase. Second, the data we have presented are based in many instances on very small numbers and should be considered as no more than tentative preliminary findings. Third, we have had no difficulty in finding extraordinarily gifted young people who are ready for and profit from their experiences at the University. Although we are quite confident that we are doing the right thing by allowing these young people entrance to the University, it remains to be seen how their college and post-college careers will compare with those of other bright students entering after high school at older ages. The data we are collecting now should help to clarify a number of issues about which, at this point, we have only impression and conjecture.

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